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Volume 18 March 1949 Number 3

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Further details will be available in the convention program.

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With which are consolidated "The Industrial Doctor" and "International Journal of Medicine and Surgery"

This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests, and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited. The editors will exercise care in checking on the accuracy of data printed but in all other respects articles and opinions of which expression is allowed are the opinions of their authors—the editors reserving in all cases the right to comment on the same in the current or any subsequent issues as they may be inclined.

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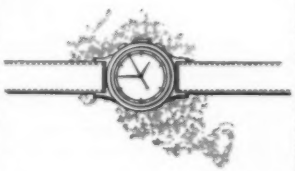

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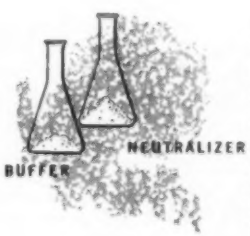

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DR. A. B. C. KNUDSON, Washington, D. C., was recently appointed Chief, Physical Medicine Rehabilitation Division, Department of Medicine and Surgery, Central Office of the Veterans Administration. Dr. Knudson is a graduate of the University of Minnesota Medical School; he later took post-graduate work in physical medicine at the Mayo Clinic and at the Massachusetts Institute of Technology. He is a Fellow of the American College of Physicians, and the American Psychiatric Association.

THE following is from the article entitled "Peoria," by ELISE MORROW, in the *Saturday Evening Post*, for February 12, 1949: "The Peoria Plan for veterans was developed originally by Dr. Harold A. Vonachen, director of medicine at Caterpillar, who also is president of the American Society of Industrial Physicians and Surgeons and commodore of the Illinois Valley Yacht Club. Doctor Vonachen is an impassioned, energetic, rather cherubic-looking man who feels very strongly about everything, including overeating. In the executives' dining room at the Cat plant, he snatches desserts from the hands of sputtering vice-presidents whom he regards as too corpulent, and he has organized the Caterpillar Fat Men's Club, the purpose of which is to shame members into keeping their figures. The father of seven children, Doctor Vonachen is a member of one of Peoria's most notable self-made families. His brother, County Judge Francis Vonachen, is a saintly man dedicated to fighting juvenile delinquency; the head of one correctional institution in Illinois has remarked that if there were a few more judges like Vonachen there would be fewer delinquent children. Another brother is a prominent pediatrician."

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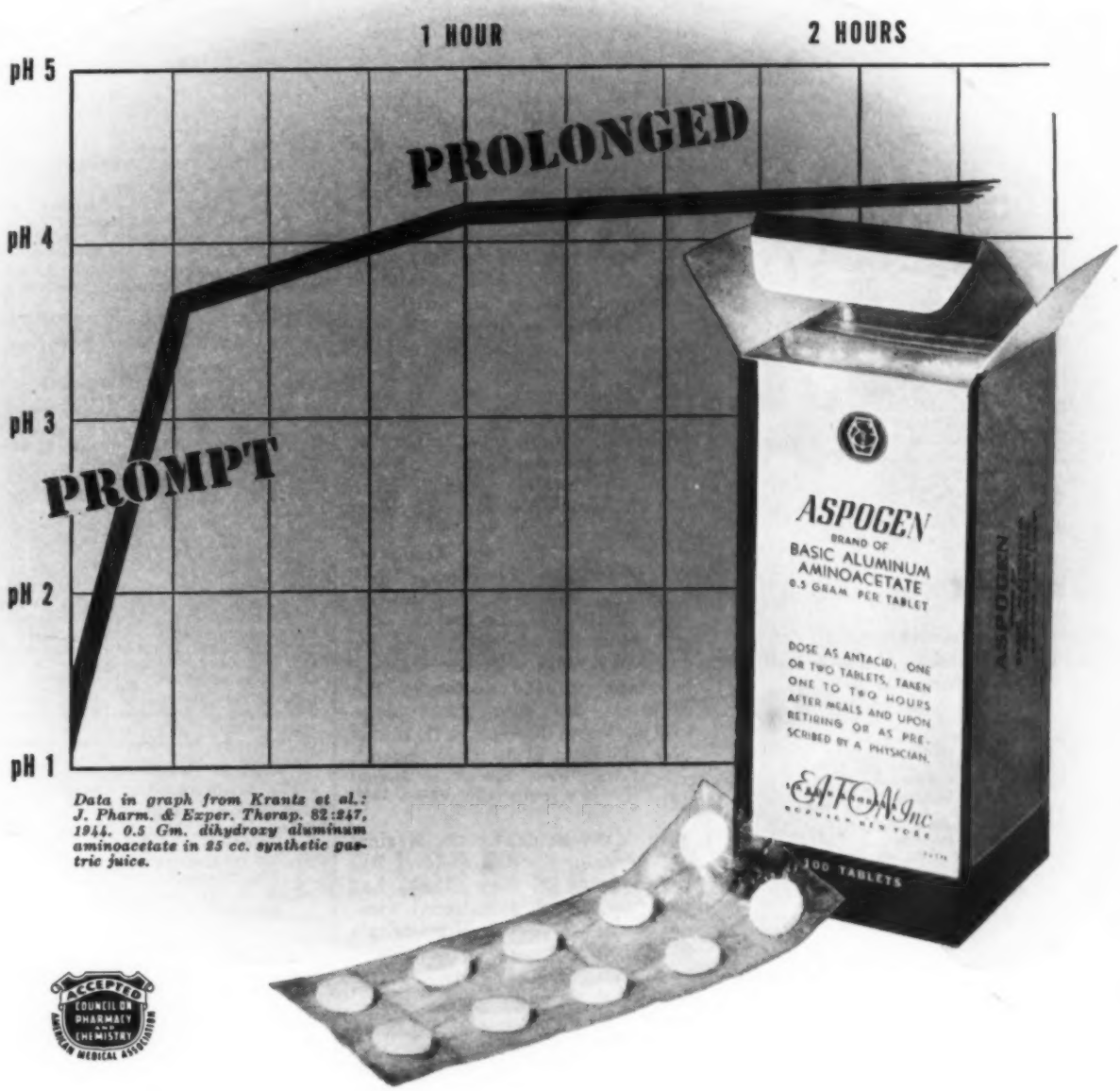

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and are tied down to their homes. Outside interests are definitely needed, according to DR. LEMCKE. She is the first woman physician to direct completely medical matters for a major operating unit of the Bell Telephone System: She heads a staff which includes three men doctors and 10 women doctors, nurses, technicians and file clerks. The department handles 250 cases a day. The frequency of colds is a major problem in industrial medicine. And industrial medicine, "is the place to find out something about colds." Blue-eyed, vivacious, with a warm, unassuming personality, DR. LEMCKE rose to the newly-created top position in the medical department after several years with Long Lines. She is a physician in the Out-going Patients Department of the New York Hospital-Cornell Medical Center. Herself a Cornell graduate, she interned at New York Hospital. A Barnard graduate, she worked as a medical technician for four years at the old New York Hospital before she studied medicine. When she decided to become a doctor she told her boss, a head doctor at the hospital. He said, "I've done everything to discourage it. But if you still want to do it, go ahead."

—From "News Notes," in *Medical Woman's Journal*, November, 1948.

DR. MARY M. CRAWFORD, Medical Director for the Federal Reserve Bank of New York, has been appointed a national vice-chairman for Cornell University's $12,500,000 Greater Cornell Fund campaign. DR. CRAWFORD, the first woman to be named a vice-chairman for the fund drive, is a graduate of Cornell, of the class of 1904, with the M.D. degree from Cornell Medical College. Following her graduation in 1907, she became an intern and later an ambulance surgeon at the Williamsburgh Hospital in Brooklyn. During World War I she served with American Ambulance groups in France and with the Red Cross medical station for servicemen and their families in New York. She has been associated with the Federal Reserve Bank of New York since 1918, and in her capacity as Medical Director is responsible for the supervision of the health of the bank's 3,800 employees. She was an alumni trustee of Cornell during 1927-37, and is a former president of the Cornell Medical Alumni As-

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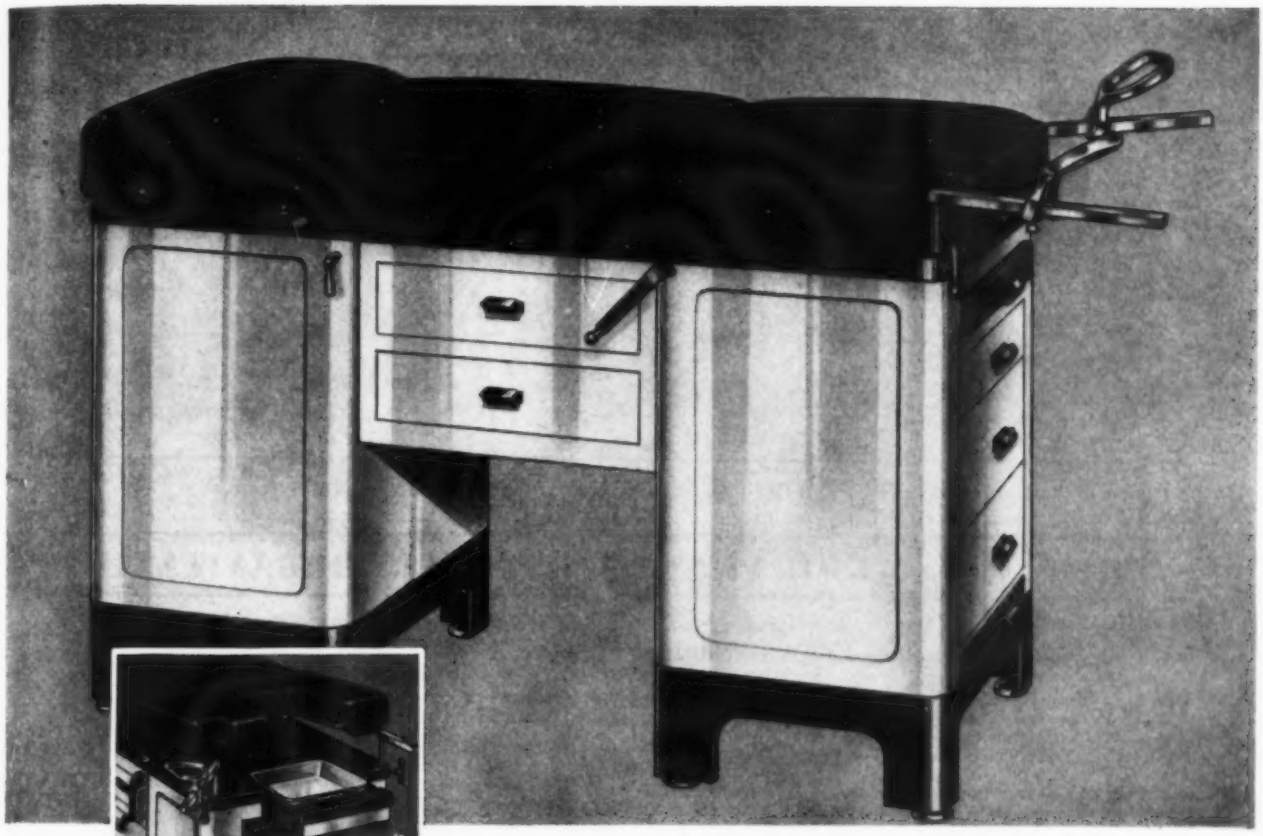

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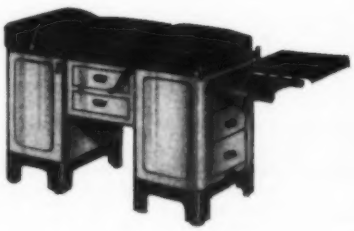

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American Chemical Society, 1155 Sixteenth St. N.W., Washington 6, D. C. A. H. EMERY, Secretary.

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American Conference of Governmental Industrial Hygienists, U. S. Public Health Service, Washington, D. C. J. J. BLOOMFIELD, Secy-Treas.
April 2-5, 1949; Detroit.

American Industrial Hygiene Association, 4400 Fifth Ave., Pittsburgh 13, Pa. HENRY F. SMYTH, JR., Executive Secy.
April 5-7, 1949; Detroit.

American Medical Association, Council on Industrial Health, 535 North Dearborn St., Chicago 10, Ill. CARL M. PETERSON, M.D., Secretary.

sociation. She was a vice-president and director of the Cornell Alumni Corporation, and was women's chairman for the campaign which erected the Cornell men's dormitories as a World War I memorial.

DR. DELMA WELLS CALDWELL, formerly of the Medical Staff of the International Harvester Company, and Associate Professor of Medicine at Northwestern University, has been appointed Medical Director of the Standard Oil Development Company, Linden, New Jersey. Upon graduation from Northwestern in 1936, DR. CALDWELL was granted a Research Fellowship in Pathology at the University of Chicago where he received his Ph.D. in 1939. In 1941, he received his M.D. degree from Rush Medical College of the University of Chicago. Following internship at the Presbyterian Hospital of Chicago, he served as Resident in Medicine at the Presbyterian Hospital, and was appointed Director of the Central Free Dispensary from 1942 to 1945. In 1945, he became instructor in Medicine at Northwestern University Medical School, and in 1947 was appointed Associate Professor of Medicine. From 1941 until the present, he has maintained a private practice limited to internal medicine, and has served as Director of the General Medical Clinics, Supervisor of the Diabetic Clinic, and Lecturer in Disease in Metabolism at Northwestern University. He is a Fellow of the American Medical Association and of the American Diabetes Association.

American Medical Association, 535 North Dearborn St., Chicago 10, Ill. GEORGE F. LULL, M.D., Secretary & General Manager.

American Public Health Association, 1790 Broadway, New York 19, N. Y. REGINALD M. ATWATER, M.D., Executive Secretary.
November 8-12, 1949; Boston.

Association for the Surgery of Trauma.

Canadian Public Health Association, Vancouver, B. C., Canada.

Council on Industrial Health, American Medical Association; Secretary: CARL M. PETERSON, M.D., 535 N. Dearborn St., Chicago 10. Congress on Industrial Health, January 18-19, Drake Hotel, Chicago.

Industrial Hygiene Foundation of America, 4400 Fifth Ave., Pittsburgh 13, Pa. JOHN F. MCMAHON, Managing Director.
November 17-19; Pittsburgh.

International Association of Industrial Accident Boards & Commissions, MARSHALL DAWSON, U. S. Dept. of Labor, Washington, D. C., Secy-Treas.
September 12-18; New York.

Lead Industries Association, 420 Lexington Ave., New York 17, N. Y. ROBERT L. ZIEGFELD, Secretary-Treasurer.
November 15-16; Chicago.

National Council on Rehabilitation; Secretary-Treasurer: MR. HOLLAND HUDSON, 1790 Broadway, New York 19.

National Metal Congress, Philadelphia.
October 25-28; Philadelphia.

National Rehabilitation Association, 411-7th Ave., Nashville 4, Tenn. LOUIS R. SCHUBERT.
December 6-10, 1948; Madison, Wis.

National Safety Council, 20 North Wacker Drive, Chicago 6, Ill. NED H. DEARBORN, President; CARMEN FIRH, Secretary.
October 18-22; Chicago.

National Tuberculosis Association, 1790 Broadway, New York 19, N. Y. H. STUART WILLIS, Secretary.

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1. Criep, Leo H., and Aaron, Theodore H., *Neohetramine: An Experimental and Clinical Evaluation in Allergic States*, The Journal of Allergy, Vol. 19, No. 4, pp. 215-224, July, 1948.

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BIBLIOGRAPHY: (1) Lehr, D.: Brit. M. J. 2:943, 1947. (2) Lehr, D.: Brit. M. J. 2:543, 1948.

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Laryngoscope, Feb. 1935, Vol. XLV, No. 2, 149-154; Laryngoscope, Jan. 1937, Vol. XLVII, No. 1, 58-60; Proc. Soc. Exp. Biol. and Med., 1934, 32-241; N. Y. State Journ. Med., Vol. 35, 6-1-25, No. 11, 590-592.

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(1) Joslin, E. P.: Postgraduate Med. 4:302 (Oct.) 1948. (2) Kemper, C. F.: Rocky Mountain M. J. 45:1092 (Dec.) 1948. (3) Pollack, H.: New York Med. 4:15 (Dec. 5) 1948.

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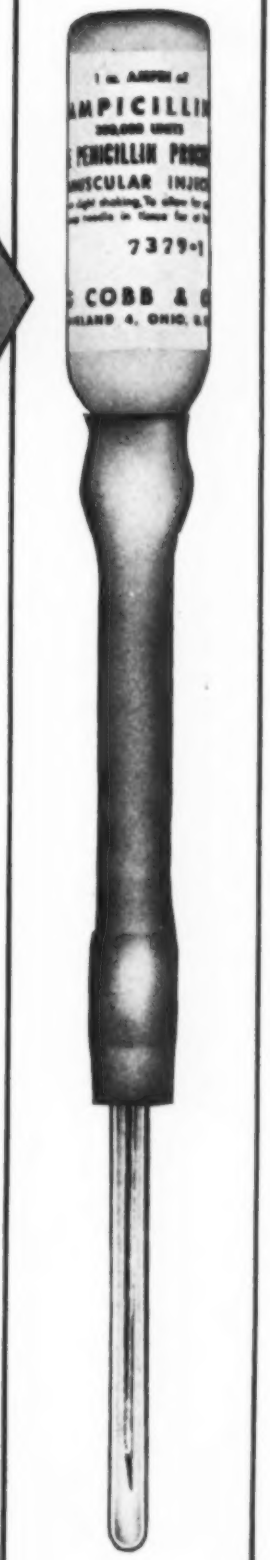

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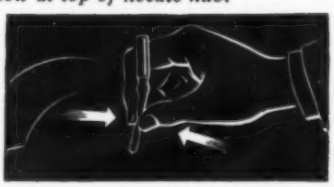

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Ready-to-eat or Hot Cereal, 1 oz.;	PROTEIN..... 20.7 Gm.	7.1 Gm.
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Sugar, 1 teaspoon;	PHOSPHORUS.... 488 mg.	206 mg.
Toast (enriched, white), 2 slices;	IRON..... 3 mg.	1.6 mg.
Butter, 5 Gm. (about 1 teaspoon);	VITAMIN A..... 1074 I. U.	193 I. U.
Whole Milk, 8 fl. oz.	THIAMINE..... 0.52 mg.	0.17 mg.
	RIBOFLAVIN..... 0.87 mg.	0.24 mg.
	NIACIN..... 2.3 mg.	1.4 mg.
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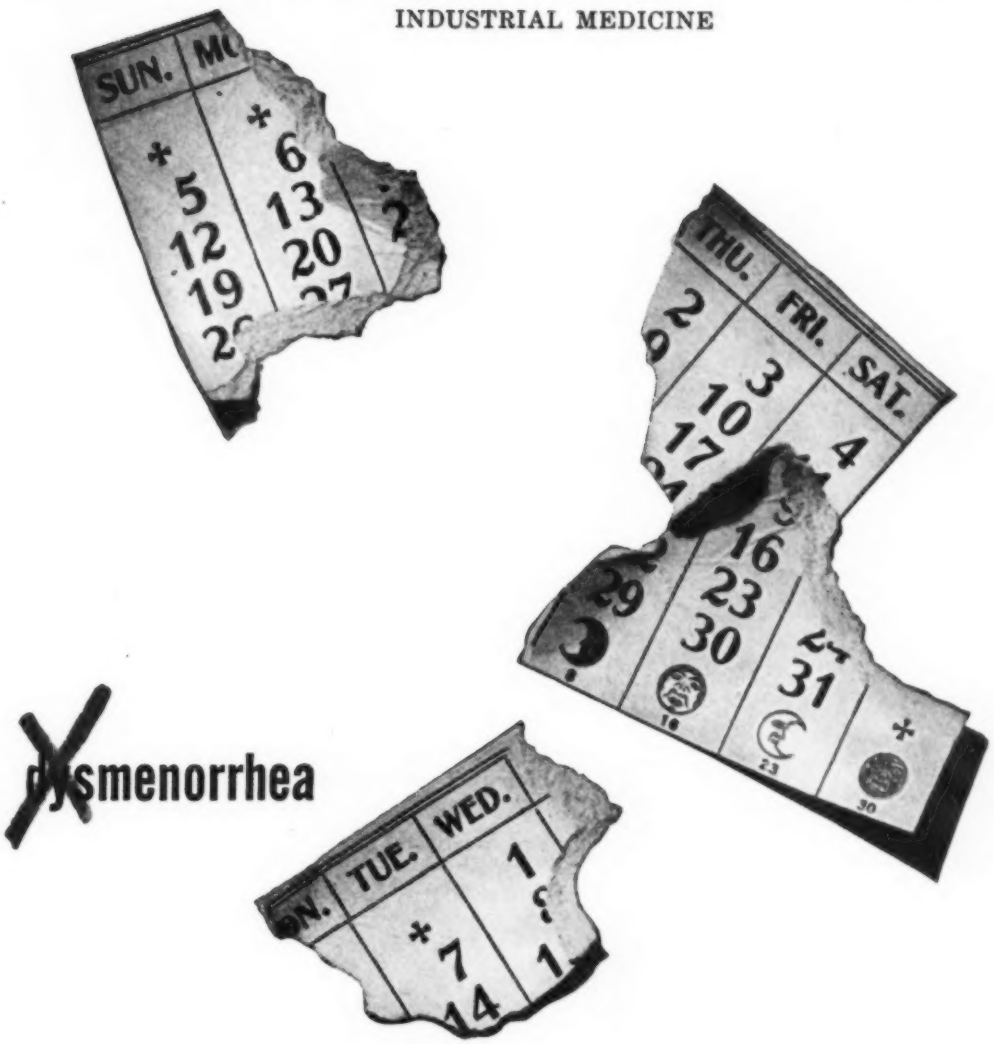
**Composite average of all breakfast cereals on dry weight basis.*



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INDUSTRIAL MEDICINE

Volume 18 MARCH 1949 *Number 3*

The Injured Knee — The Negative X-Ray

JAMES K. STACK, M.D., F.A.C.S.,
Chicago

WE SHALL limit this discussion to those lesions which are important to all of us on their traumatic basis, and in which, when the x-ray is not helpful, we are forced to fall back on good old-fashioned clinical judgment. Many of the congenital, neoplastic, inflammatory and metabolic conditions that arise in the knee may be called to the attention of the patient by a blow or a twist, and while the establishment of the diagnosis will rule out trauma as an exciting or important factor, nevertheless these things do come into the differential diagnosis.

We are unable in a half hour to consider every lesion of the knee that casts no significant x-ray shadow—for instance, the congenital things like the discoid meniscus, the neoplastic conditions, all the way from the malignant type of synovioma down through the cytoma, the villi nodular synovitis, and occasionally the granulomas which will be formed by pinching of the edematous membranes in the working surfaces of the joint.

The many bursas, eight or 10, that may be involved in inflammatory conditions in and around the knee do not cast any x-ray shadow. The specific and non-specific forms of synovitis will not cast a shadow in their early stages. And finally, metabolic conditions, such as gout, can cause joint difficulties, complicating the diagnosis, and yet will not produce any change on the x-ray.

So I have chosen four general groups of problems to talk about, and the first one is perhaps the one we most commonly meet and, for that reason, the most worthy of review.

THAT one is the everyday, acute traumatic type of synovitis. This is perhaps the most common and the simplest of those lesions of the knee which cast no significant x-ray shadow, even though in most instances one will be able to see an outline of soft tissue detail such as the tendon of the quadriceps muscle in the lateral profile view. This lesion usually accompanies internal derangement of one kind or another, because the initial injury is not of a type that can pick out a single structure. For instance, a man tears his meniscus for the first time, the violence which produces that tear cannot possibly pick out the meniscus without producing associated injury to the soft parts of the joint, the commonest of which is the accompanying acute traumatic synovitis. The knee is a sensitive joint and will respond to small amounts of blood by relatively great synovial effusion, and, unlike some joints, for instance, the hip and the wrist, there is plenty of articular room to swell because of the quadriceps bursa immediately superior to the joint proper. This swelling will follow soon after the trauma, usually a matter of hours rather than days, and the patient will present himself walking painfully on a flexed knee or being carried with the knee in this position. When examined at this time it will be virtually impossible to make an exact diagnosis. The swelling will be generalized. The patient will be unable to localize the pain other than to say it is medial, lateral, posterior or anterior, and the examiner's palpation will not bring out significant points—at least no point significant enough to warrant exploration of the joint.

The next step in the management of the acute, traumatic synovitis is the aspiration of the joint, and this should be done for three reasons: First, relief of tension thus obtained will alleviate much of the pain and permit more complete extension of the knee; second, it will prevent excessive distention of the synovial membrane and the capsule, which so often leads to bogginess and delayed recovery; and third, it will protect, in a measure at least, the quadriceps muscle because this muscle is extremely sensitive to inter-articular lesions of any kind and atrophies rapidly, and regains its power and tone slowly. Pressure dressings of rolled cotton or ABD pads from the toes to mid-thigh are applied to prevent recurrence of effusion, and the patient is urged to lie with pillows under the leg and the back of the knee unsupported. This is calculated to overcome the tendency toward flexor contractures. Traction below the knee may be applied. If you desire, ice-bags may be put over the pressure dressing. After about four days, moist warm packs will hasten absorption of what swelling remains, and in seven to 10 days the condition will usually be such that a satisfactory evaluation can be made. It is then that most of us will be able for the first time to sit down with the patient and intelligently try to determine what, if any, inter-articular disturbance has occurred.

After this the diagnosis of traumatic synovitis without internal derangement may be tentatively arrived at by a process of elimination. However, even then a mental and oral reservation should be made against the possibility of occult derangement which may recur in the near future.

Presented at the Sixtieth Annual Meeting of the AMERICAN ASSOCIATION OF RAILWAY SURGEONS, Chicago, November 23, 1948.

ANOTHER lesion that is important is hypertrophy and intrusion into the working surfaces of the joint of the infrapatellar pad of fat. This is sometimes known, and is called in the old literature, Hoffa's disease, because of his description of it many years ago which was and still is adequate. There are many people who doubt the existence of the disturbances of the infrapatellar fat pad as a clinical entity, and feel that it is just a convenient postoperative diagnosis to be made when the torn cartilage sought at operation is not found. I do not believe this, and we are at present concerned with studies to show the types of intra-articular intrusion of the fat pad and the actual cartilaginous lesions they will produce. It is true that many times a clear distinction of types of internal derangement cannot be made on clinical examination, but frequently a rather typical fat pad syndrome can be made out, and often it can be proved at operation. The patient will usually look back on repeated episodes of what he terms pinching. This pinching takes place ordinarily as the knee is brought into complete extension; pain will be felt anteriorly on either side of the patellar tendon as the knee is brought through the last 5° of extension; and this feeling will be accompanied in many instances by weakness—a feeling of weakness—or locking, and perhaps even by a fall. Slight effusion may follow these episodes of pinching and may persist for several days, but under the influence of heat and rest the effusion subsides and the joint will gradually be permitted to resume the complete extension which was impossible before.

The majority of these patients will be overweight, and many times relief from symptoms may be brought about by a substantial weight reduction. You are all familiar with the fat pad that lies inferior to the malar or cheek bone, and you know how sensitive this fat is to weight reduction. One of the objections that many women will have to weight reduction is, as they say, "I lose it in my face rapidly, but I cannot take it off any place else, particularly the places that interest me." We believe that the infrapatellar fat pad is also a sensitive area, because many of these people have lost their pinching sensations and have had no more episodes of pain when they have made a reasonable weight reduction.

On examination of the knees of the patient whom you suspect of having Hoffa's disease, with the knees flexed to 90°, you will many times note a fullness on each side of the patellar tendon as compared with the uninvolved knee. Normally most people will have a concavity medially and laterally to the patellar tendon, and if you can make out that one side of this area is convex instead of concave as compared with the other side or as compared with the other knee, then there is reasonable evidence at least that the convexity is due to more fat behind the tendon than is normal. If this asymmetry is not outstanding as you look at the knee in frontal view, you often can detect it by looking down. The patient's knees are bent, and you put your head above his knees and look down, and convexity, or at least the absence of concavity, may be determined by that line of vision.

Tenderness on pressure will be present over the anterior and medial aspects of the joint at the time the tissue is actually impinged, but this will subside as the inflammation in the fat pad subsides and as the induration of this tissue is gradually released. When the knee is opened with this diagnosis in mind, or with any diagnosis in mind—except the usual anteromedial longitudinal incision that we use to excise, say, the meniscus—the fat pad immediately comes into view as the synovia is opened. If the joint is inspected before the normal relation of the fat pad is disturbed by retractors, it will be noted that a tong-like projection of the pad intrudes, usually between the medial femoral condyle and the medial portion of the tibial plateau. This tissue will be flattened, firmer than normal, and many times actually hyperemic. In cases of long standing, signs of wear may be noted on the portion of the medial femoral condyle just before it turns to form one side of the intercondylar groove. This cartilage will be softened, grayish in color, and may be cracked or fibrillated. There will be no mistaking the location of this cartilaginous lesion. As you see it, you will immediately think of osteochondritis dissecans; yet the x-ray has ruled out that disease, and in this lesion produced by fat pad intrusion it isn't as localized but occupies an area usually about the same size.

The second most common point of intrusion of the fat pad is between the femoral condyle and the articular surface of the patella. You will recall that when the knee is opened by the usual parapatellar incision with the joint in complete extension, an extension of the fat pad is seen to lie at the level of the patella, and many times a tong-like extension will be alongside the patella and it is easy to see how portions of this tissue can be readily impinged between the patella and the underlying femoral condyles. One wonders, since we do not have any other good explanation of this common syndrome of chondromalacia of the patella, if perhaps the repeated intrusions of the tong-like projections of fat could be responsible for the signs of wear and tear seen so commonly on the intra-articular surface of the patella. This, of course, will not show on x-ray. Occasionally the fat pad will be so enlarged that it will resemble the arborescent lipoma that has been described occupying the space underneath the palmar fascia of the hand. We have two such cases in our series. The lesion of the patellar cartilage will resemble that described in the femoral condyle and will be responsible for the creaking, grating and pseudo-locking described by so many of these patients.

Treatment is, of course, subtotal excision of this fatty mass.

I am quite sure that many of the successful arthrotomies done under the pre-operative diagnosis of ruptured meniscus and the post-operative diagnosis of no disease are due to the fact that in order to explore a knee through the usual menisectomy incision one must first remove a substantial portion of the infrapatellar fat pad. If this is not done the intercondylar notch and the tibial attachment at the crucial ligament will not be seen, and neither can the anterior portion of the lateral meniscus be visualized. Many of the patients who get well after arthrotomy without producing any articular change do so because their original lesion was one of hypertrophy and intrusion of the fat pad and not a rupture of either meniscus.

THE third condition that must be met in which the x-ray is not helpful is the patient who was operated on elsewhere and who comes in with the story that he was injured and the usual conservative measures were used. In five or six weeks he didn't get better and the doctor thought it must be a cartilage. So the cartilage is removed. The report, then, from the other doctor will say, "Yes, we took out the cartilage, but the man still has not returned to work." These are things we all have heard hundreds of times. The man will speak of "lack of confidence"—"a feeling of giving way"—"something catches." "It buckles under me when I least expect it." These are expressions with which we are familiar, and you can sympathize with the man who is reluctant to return to a job which involves getting off and on moving railroad cars in a dark switch-yard during a midwestern winter. He just isn't going to do it. I will remind you again that railroading is a hazardous occupation at best, and, if your knees do not feel secure under you, it is even more hazardous.

When examining a knee under the conditions above described one should first note the size and contour of the thigh and make actual comparative measurements in the middle and distal third, because there is no question that the loss of quadriceps power and tone following an injury or an operation, or both, is an important factor in the prolongation of the convalescent period. It is the quadriceps muscle which is responsible for our ability to bear weight on the bent knee, to boost the body weight up a stairs, and it plays a stabilizing role when the collateral or crucial ligaments of the knee have been damaged.

Many of these cases of slow recovery are due solely to quadriceps involvement, and great attention should be paid to the quadriceps muscle from the time the patient is first seen, and particularly from the first postoperative day. There isn't any reason the usual arthrotomy patient cannot begin his quadriceps exercises as soon as he awakens from the anesthesia. If other factors are eliminated, satisfactory response can be expected following an exercise regimen designed to strengthen the quadriceps muscle.

ANOTHER important finding one must be alert for is improper tracking of the patella. In some instances the patella instead of working in the midline of the femur in the intercondylar groove will tend to ride laterally along the lateral side of the intercondylar knotch, and this is particularly true in people who are overweight and who have a tendency toward knock-knee. This will produce a gradual diminution of quadriceps power and tone and a definite and progressive chondromalacia of the articular surfaces of the patella and underlying femoral condyles. When such cartilaginous change has occurred there will be heard a faint grating which will be intensified by the action of the quadriceps muscle against resistance, as in boosting one's self up a step or straightening the flexed knee against the resistance of the examiner's hand. The crucial ligaments should, of course, be thought of and their function reviewed. The anterior crucial ligament is designed to prevent the tibia from riding anteriorly on the femur, and the posterior crucial ligament is designed to prevent the tibia from riding posteriorly on the femur. The anterior one is taut when the knee is in extension, and the posterior one is taut when the knee is flexed. The adequacy of these ligaments, of course, should be tested along with the lateral and medial collateral ligaments. When examining a person's knee for stability of any of the ligaments the other knee should always be examined because there is quite a wide range of normal, and many people have a little antero-posterior play in their knees and a little medial and lateral play which may not be significant.

The history may impress the surgeon to the extent that he will recommend a second exploration of the joint. Then what are the important things to look for? The most important is a comma-type tear of the medial or posterior portion of the medial meniscus. These tears cannot be seen unless the anterior portion of the meniscus is grasped and pulled forward and at the same time firm pressure is placed on the posterior portion of the calf (this is with the knee flexed at 90°) to bring the tibia forward on the femur as much as possible. Then if the patient has enough laxness in the joint you may be able to visualize the tear, but in many people you cannot, and the tear is not seen until you have removed the meniscus. The fat pad should be incised so that a thorough inspection of the entire joint may be made. The articular surfaces of the femur and patella should be examined, and if there is any question about the integrity of the lateral meniscus, a second incision should be made lateral to the patellar tendon and this structure thoroughly investigated.

Habitual dislocation of the patella with the weakness that accompanies it should always be thought of in these vague knee disturbances. The doctor will seldom find the patella dislocated, and patients may be a little vague about what actually happens. Now and then under real

questioning they may say, "My kneecap was off to one side," but usually they have the same story about something giving, clicking and "popping"—and then in their fall, or in their attempt to stand or to move, they extend the knee and the patella is spontaneously reduced. Yet in a few hours there develops all the signs of some serious traumatic condition. So that is a possibility we should always have in mind.

THE fourth, and last, topic is chondromalacia of the patella. Why is it that an 18-year old girl will come in accompanied by her mother who will say, "We are so embarrassed for Mary because when she comes downstairs or goes upstairs you can hear her all over the house. You can hear her knees make that noise." This excessive grating between the patella and the femoral condyles is due to chondromalacia, softening of the cartilage, providing the other causes have been ruled out. It occurs frequently in people who have had their knees immobilized for long periods. A man breaks his tibia and it is in a cast for two, three or four months. One of his complaints later is, "This knee grates and clicks more than it did before and more than the other member." It is a difficult thing to explain, and it is even more difficult if the description of this noise-making is ascribed to injury.

There appears to be little question but that a substantial fall or blow on the patella can certainly push the two cartilaginous surfaces together so that conceivably one can get a softening which may be an etiological factor in the development of the trouble later. Or, when this is seen in young people, it may simply be due to poor cartilage, just as when we see these intervertebral disk degenerations without any neurological findings and discover a space reduced 50% in a 21-year old boy with no history at all of injury.

I think it is reasonable to assume, in somebody like that, that he was born with a poor disk. There are people who are born with poor hair. There are others who are born with poor teeth. You see two-year olds wearing thick glasses. There isn't any reason why in people, in youngsters at least, this chondromalacia can't be due to poor tissue to begin with. But chondromalacia is a real problem. It is not seen on the x-ray, and it follows injury both to the knee and to adjacent parts often enough so that in our work we have to consider it. If it goes on, then recurrent effusions will take place and there will be a gradual development of weakness in the quadriceps tendons. The only treatment that I know of is either a debridement of the patella or a total patellectomy, and they both seem to do quite well. Two things should be kept in mind in the treatment of chondromalacia. They are prophylactic. One is that those people should be taught to avoid stairs just as much as possible and, if they live in a city like Chicago, we tell them to move to an elevator building so that they won't have to climb stairs. The other is that the elastic bandage many people put on, or the elastic stocking, is generally harmful because it serves no other purpose except to press these two cartilaginous surfaces together and thus increase rather than alleviate the difficulty.

Announcement

PRE-CONVENTION MEETING, Tuesday, April 5, 1949, 10:00 A.M., Book-Cadillac Hotel, Detroit, Michigan.

This meeting will be a Round-Table discussion and general get-together. All members and guests of the A.A.I.P.&S. are invited.

The discussion will be on RESTORATIVE SURGERY, with special emphasis on SURGERY OF THE UPPER EXTREMITY including SURGERY OF THE HAND.

Time and meeting room will be announced later.

Ophthalmological Problems in Industrial and General Practice

JAMES W. CLARK, M.D.,
Chicago

MY PURPOSE is to discuss the types of eye injuries that end up with the ophthalmologist, their treatment, and the complications that so often bring them to us.

Most of the cases I see are the ones in which complications have developed, so I believe that I have been able to pick up a few points that can prevent the complications. Most of the references to us from industrial situations are corneal injuries. The majority of these are simple foreign body cases that do not really need to come to a specialist. A foreign body is removed and three or four days later the eye still has a foreign body sensation and the patient requests consultation or the doctor sends him in simply because we are available. In the majority of these the cornea is slow in healing and the patient feels there is still a foreign body present. However, a certain number have marked rust ring remaining. These will usually heal up in spite of the rust, but many do remain irritated for a week or so, and occasionally secondary infection results with disastrous effects.

In this particular type of case I have been impressed by the fact that if the doctor does not get the rust ring out at the time of the first examination and treatment he lets the case go. It is far better to have the patient back a second day and to curette the eye a second time than to leave this rust present. A day or two afterwards necrosis occurs around the ring and it can be easily removed. It is certainly preferable to have the patient back for further curetting than to leave a rust ring present, keeping the erosion open so that secondary infection may possibly occur.

Another type of corneal injury that causes a great deal of trouble is the one where corneal ulcer has already developed. The most efficacious treatment of a corneal ulcer is to prevent its occurrence. In reviewing the corneal ulcers that I have seen lately, excluding the ones where the patient has been responsible by not seeking treatment sufficiently early, I have found that several factors seem to stand out. First, the routine use of an anesthetic ointment, while it gives the patient a great deal of relief, seems to increase the number of secondary infections. Whether this is due to a decreased resistance on the part of the cornea because of the continued anesthesia or to increased exposure and resultant infection is a question, but I certainly believe it is a mistake to give the patient with a fair-sized corneal lesion a tube of ointment containing an anesthetic and antiseptic and send him back to work with the eye uncovered with instructions to use the ointment whenever the eye becomes painful. It is often advisable and necessary to give the patient an anesthetic, but he should be cautioned to use it sparingly and warned of the dangers of too constant use. Far better to take the man off the job for a day or so than have him lose a week or two later.

A second factor that seems to stand out is the failure of certain drugs and biologicals to control certain types of infection. Theoretically, if we could culture every eye that we see with a corneal lesion and test the effect of penicillin and sulfa on the culture, we could probably be sure of our treatment. This cannot be done, and the next best thing is to choose our drugs so that we are unlikely to waste time treating an infection with a biological that has no effect. I have seen several corneal ulcers which developed in spite of intensive penicillin treatment beginning the day of injury. In two of these I cultured and tested the culture growth from the penicillin. One severe corneal ulcer which I saw recently, and which developed hypopyon and went on to perforation and panophthalmitis, was treated with sulfathiazole ointment, 5%, beginning from the day of injury. After this patient was hospitalized a culture was made and the culture tested with the same ointment that was used on the patient.

There was some inhibitory effect from the sulfa ointment, but much less than from White's ointment, which is a combination of mercuric bichloride and sodium bichloride. I believe the explanation of this is that there are more and more strains of bacteria resistant to penicillin and sulfa.

In cases of corneal injuries where the lesion does not clear up quickly or where there is evidence of infection with the likely development of an ulcer I believe it is better to use both penicillin and sulfa together rather than to depend on one or the other. Of the sulfa ointments I prefer sodium sulfacetamide. Of the sulfa preparations I prefer sodium sulfacetamide. This comes both in ointment form in a strength of 10%, and in solution in a strength of 30%. It has caused fewer reactions, and the eyes clinically seem to get along better. In uncomplicated lesions of the cornea I have gone back to the use of White's or mercuric bichloride ointment.

Once a corneal ulcer has developed, I culture the eye and, if possible, try the effect of the different medications on the growth of the culture. However, it is my opinion that today we have many more strains of bacteria that are resistant to the various types of medication, and to get around this I use at least two types of medication in such an eye and sometimes more. I use penicillin and sulfa and White's or mercuric bichloride ointment. It is a sort of gunshot treatment, but in this manner I think we attack practically all types of bacteria that are found in the eye.

Presented at the Sixtieth Annual Meeting of the AMERICAN ASSOCIATION OF RAILWAY SURGEONS, Chicago, November 23, 1948.

In so far as other treatment is concerned, I use cauterization with tincture of iodine neutralized with alcohol and occasionally trichloracetic acid. I do not use the actual cautery. Use of the thermophore, which is an instrument in which the temperature can be accurately regulated, is also very good. It is really pasteurization of the corneal lesion rather than cauterization, and it is very beneficial.

Another form of treatment which I think is very beneficial and which is used much less than it should be by people who are taking care of this type of case is paracentesis. It was early observed that in those cases where perforation occurred in corneal ulcer the cornea often healed very quickly. Unfortunately, where spontaneous perforation occurs there is usually an adherent glaucoma with resultant decrease in vision. A paracentesis done at the edge of the cornea with a thin-bladed Von Graefe knife is usually a perfectly safe procedure, and I believe should be used by everyone taking care of these cases much more frequently than it is. Care must be taken that the point of the knife does not strike the lens or the iris. The incision should be made in the corneal tissue just inside the corneo-scleral junction. The incision can be opened on subsequent days by means of an iris spatula and the anterior chamber collapsed for three or four days. This results in the formation of new aqueous fluid which is much more resistant to the infection and sometimes this procedure produces startling effects.

An incision through the central portion of the cornea to prevent its spread to the visual area as well as collapsing the anterior chamber is even better than a paracentesis at the edge. This is the delimiting keratotomy of Gifford and is very efficacious. However, this procedure is a great deal more difficult than it sounds, and takes considerable training and experience to make the incision in the right spot without damaging the internal structures of the eye, and I believe it should only be done by one doing a great deal of this work. Paracentesis at the edge of the cornea, I believe you will find, can be done very successfully by anybody who does any work on the eye.

The use of fever therapy in corneal ulcers should not be routine. While it does tend to combat the infection, it also tends to increase necrosis of the cornea and spreads the ulcer. However, in those cases where the eye continues to get worse in spite of all other treatment it should be attempted. When fever therapy is used, a paracentesis, performed when the fever is up, is particularly efficacious.

One other point that should not require mentioning but definitely does, is the taking of an x-ray in all cases of corneal ulcers. Too few x-rays are taken on eyes unless the doctor feels there is a possible intraocular foreign body. From a medicolegal standpoint it is just as important to have an x-ray on an injured eye as it is on an injured leg. Every time a man bumps his leg, regardless of how slight the bruise, if there is a medicolegal aspect an x-ray is taken. On my side of the fence, we see eye after eye in which an x-ray should have been taken and was not. We can spend hours arguing that an x-ray was not necessary, and we know and the other doctors know that it was unnecessary, but if the case comes before a jury, or before a board, it is just a waste of our breath because they will invariably ask first of all if an x-ray was taken, and if the answer is "no," we are condemned without going any further.

Another type of corneal lesion we see quite frequently that causes a great deal of trouble is a laceration through the cornea. What often happens here is that the laceration is well covered with a flap and the eye heals up nicely, but we find that a very large tongue of iris has been left in the wound and the eye is inflamed or clears up, and then if inflammation occurs after a period of three or four weeks we keep getting a more and more painful and reddened eye, and the eye is lost in spite of prompt and what seemed at the time to be adequate surgical care. It is my opinion that the conjunctival flap gives as good results in these cases as corneal sutures. A clean linear laceration can often be closed satisfactorily with corneal sutures, but I have come to the conclusion, both from my own cases and from others that I have been, that the flap will do anything the sutures will do, and it is certainly much safer to be used. I started using corneal sutures on corneal lacerations in the service and continued for quite a period, but I had so much trouble with them that I have now gone back to the use of conjunctival flaps and have continued using them entirely.

The inclusion of iris in the wound is one of the major problems here and is usually difficult to handle. One can usually get the iris back into the anterior chamber through the original wound but keeping it there is sometimes a problem. One trick that is very efficacious in getting around this is by making a corneal section near the limbus in the good corneal tissue. The iris can then be drawn down through the section and an iridectomy done. If this cannot be done, it is necessary to attempt an iridectomy through the original laceration. In doing a section at the limbus, as previously mentioned, it is necessary to be very careful not to injure the lens which is pushed forward. By making the section with short, gentle cuts with a very sharp Von Graefe knife it can usually be done quite safely.

Another advantage of making such a section is its use for irrigation. The section can be held open with an iris spatula and the tip of a lacrimal needle inserted just into the anterior chamber. Irrigation in this manner is much more satisfactory than through the original incision, and if the tip of the needle can be placed over the iris where it is not torn, the force of the fluid will often push it back out of the wound and fill the anterior chamber to a sufficient degree that the iris will not be included in the wound healing.

The objection that has been raised to this is that you traumatize the iris cornea, which is already badly lacerated, just that much more. Actually, I think that is not valid at all, because you make your section near the limbus. You make a clean surgical section, and certainly the advantages obtained from it more than offset the disadvantages of an extra laceration in the cornea. When this type of section is used the flap should be all ready to tie before it is made, so that if one succeeds in partially restoring the anterior chamber the flap can be immediately tied. This, I think, is rather important. Each time the anterior chamber is partially filled and then collapsed, with the resultant pulling and tugging on the iris and its inclusion in the wound, it is a little harder to get the iris to stay back where we want it.

If the lens is injured in a corneal laceration and the cortical material is present in the anterior chamber, it can be washed out to some degree by holding the wound open with an iris spatula. A corneal section giving through-and-through irrigation facilitates this procedure also. However, the cortex will readily absorb, and I do not make much effort to wash it out if I can get the iris out of the wound and the cut edges opposed. In this type of case I routinely use sulfa by mouth, one gram four times daily, and penicillin 50,000 units, two, three or four hours. Atropine ointment is instilled in the eye once daily, and penicillin ointment and some form of sulfa ointment are instilled three or four times daily. Fever therapy in the form of typhoid injections is good, but I have had fairly good results from the above regime and now use intravenous typhoid only where secondary infection develops or where there is a prolonged iritis.

ONE of the other major problems coming up in this type of case is the disposition of the eye where it remains irritated and inflamed over a prolonged period. In other words, how soon should we enucleate the eye. In the presence of purulent infection the question is usually answered for us by the severity of the infection, However, in the cases of prolonged iritis it is often difficult to make a decision as to the disposition of the eye. Many ophthalmologists feel that a purulent infection is unlikely to cause a sympathetic ophthalmia in so much as it is more localized. However, the chances are that any injury involving the iris or the ciliary body is potentially capable of causing sympathetic ophthalmia. Once a purulent infection starts following the perforating injury the eye usually does not recover eyesight, and endeavoring to try too hard to save the one may jeopardize the uninjured or good eye.

The really dangerous type in this injury is the one in which the eye clears up to a large degree but never becomes quite clear. Recurrent attacks of more severe iritis ensue and the eye remains painful a great deal of the time. If there seems to be some chance of saving useful vision the problem is doubly hard. It has been my experience that if an iritis persists with a red, painful eye as long as two weeks, it will probably not clear up. However, there are frequent exceptions to this and if there is any chance of getting vision in the eye, and it is not too painful, I wait another two weeks before coming to a decision on enucleation. If the iritis persists up to a month, even though it clears up after that, there will be recurrent attacks and the chances are that in most cases the eye will be lost eventually. Many of these eyes can be kept two or three years or sometimes even longer. As a matter of fact, I am taking one out this morning that has been present for about 10 years and throughout that time the man has had recurrent attacks of iritis at least once or twice a year. There has been no vision in the eye, and why we should go to any trouble to save an eye like this over a period of this time is a question, because certainly it is increasing the chances of sympathetic ophthalmia to a very great degree, and those are eyes in which sympathetic ophthalmia does occur.

If the uninjured eye does not have useful vision all bets, of course, are off in the treatment of the eye and we take any chance that we can in the hope of getting vision in the injured eye.

The use of penicillin parenterally is not done with any idea of a local effect here but rather for its effect on any infection elsewhere in the body which might serve as a focus for the injured eye. Here again some of the men are bringing up a definite objection to the use of penicillin in this type of case which I think is very valid. In many instances we are doing two things. First of all, we are building up an immunity of the body to penicillin and, secondly, we give it in doses which perhaps do not completely destroy infection but simply serve as a provocative. I think that is something that we definitely must consider in our routine use of penicillin.

The time element in leaving an eye of this type is arbitrary and is based primarily on my experience with perforating injuries in the service. There are many opinions as to the time element involved in sympathetic ophthalmia, but I believe that the periods I have specified here are perfectly safe ones.

Occasionally we see lacerations through the sclera of the eyeball. These usually heal up without any trouble unless they are deep enough to injure the internal structures of the eye, or unless there is a prolapse of the uveal tissue and the laceration is in the anterior portion. It is not uncommon in an injury to see a laceration through the sclera over the ciliary body with prolapse of that structure, and it can cause tremendous trouble. If you try to excise the prolapsed portion of the ciliary body you often run into considerable hemorrhage which may get back inside the eyeball and cause much more damage than the original injury. Sometimes the prolapse can be forced back with a blunt probe as

the cut edges are drawn together and tied. This certainly should always be tried several times before excising the prolapse.

Perforating injuries through the sclera into the eyeball with resulting hemorrhage are handled similarly to perforations through the cornea. Penicillin and sulfa are given systematically and the eye watched closely for prolonged iridocyclitis.

ANOTHER type of injury that we see not infrequently is intra-ocular foreign bodies. I think that the biggest error that I have observed in these cases is the attempt to remove the foreign body without adequate equipment. Small, poorly magnetized foreign bodies require a large magnet for removal. Where an unsuccessful attempt has been made to remove these anteriorly by means of a small magnet no harm ensues. However, we frequently see an eye where one or even two attempts have been made to remove these particles posteriorly unsuccessfully. Sometimes, of course, this is the fault of localization, but in many instances it is due to the use of an inadequate magnet and the foreign body came out quite easily with the larger magnet. I routinely use the posterior route on all intraocular foreign bodies except where they are definitely localized in the anterior segment of the eye. If the particle is non-magnetic, and the eye quiets down quickly leaving useful vision, I do not hesitate to leave the eye alone.

I have had opportunity to follow some of these cases along for years and many of them do surprisingly well. However, if iritis persists or recurs, or siderosis starts developing, the eye might just as well be enucleated early rather than subject the patient to prolonged discomfort and danger of sympathetic ophthalmia.

There is one other type of injury that I want to mention and that is contusion of the eye. If a contusion results in intraocular damage there is always some danger of retinal detachment. I think it is wise to put these patients on absolute bedrest for from four to seven days. If the injury is not sufficiently severe to hospitalize the man he can be kept in bed at home. This undoubtedly will prolong the disability on some individuals, but if it saves useful vision in one out of 10 it is still very much worthwhile. It is surprising how few traumatic retinal detachments develop when the patient is put on bedrest immediately, even with very severe injuries.

IN CONCLUSION I want to emphasize once more the importance of using more than one type of antiseptic in injured eyes. I want to emphasize the use of penicillin and sulfa. If either of those ointments is used, I think there is no harm in using White's or some other type of mercuric ointment along with it. There is one other biological that I think should be mentioned. Dr. John Bellows reported the use of Bacitracin in eye infections before the Ophthalmological Society and his results, I think, are very definitely worth mentioning. So far it has not been put on the market to my knowledge, but I believe it probably will be and when it is, it should be used.

Secondly, the use of a corneal section in these lacerative injuries of the cornera where the iris cannot be drawn back through the original incision is definitely to be recommended.

Last of all, the importance of putting contusion injuries of the eye to bed I think is very much worthwhile, and I believe if that procedure is followed routinely it will save vision and loss of disability in a great many patients whom we now permit to be up and around, and in whom a week or so later we see development of retinal detachments.

Health Hazards in Aircraft Manufacturing

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AIRCRAFT manufacturing, probably more than any other industry, experienced an enormous growth during World War II. Called upon to adopt mass production methods in the manufacture of a mechanically complex and physically large product, the aviation industry took full advantage of the techniques and devices of modern industrial practice. The latest in industrial architecture and factory management were designed into the plants being built to meet the accelerating demand for aircraft. Extensive mechanical handling procedures, excellent illumination and ventilation, well-managed cafeterias, on-the-job medical attention, and many other features of progressive factory practice gave this industry an unequalled standard of general plant hygiene.

In these plants, the general occupational environment is today far above average, but there are a number of health problems associated with aircraft manufacture for which suitable safeguards must be provided. In discussing these health hazards, it will be convenient to deal separately with the three major divisions of the industry: engine, propeller, and airplane manufacture. The manufacture of aircraft instruments is ordinarily performed in highly specialized separate or subsidiary companies, and will not be discussed here.

Engine Manufacturing

THE manufacture of aircraft engines involves certain hazards, many of which are not peculiar to this industry, but are typical of all foundries and machine shops.

In the magnesium foundries, the use of special fluxes requires that attention be given to atmospheric fluoride contamination. A number of investigations in aircraft engine foundries have disclosed levels of atmospheric fluoride contamination, and urinary fluoride excretion, which suggests that storage of fluorides in the tissues of magnesium foundry workers is apt to occur unless special precautions are taken to ventilate the fluoride fumes.

Excessive contamination is likely to exist at pouring, core spraying and shake-out operations unless control measures are adopted. Lateral exhaust ventilation at the pouring operation is one control method but is not practical except in foundries which have central pouring stations. Carefully designed general ventilation for the pouring area has proved satisfactory in the absence of a central pouring station.

Fluxing with sulphur is also general practice and gives rise to sulphur dioxide fumes in the melting and pouring areas of the foundry. These fumes are highly irritating to the eyes and upper respiratory tract, but are not believed to be significant beyond these "nuisance effects."

The silicosis hazard in these foundries is almost entirely limited to shake-out operations and here the exposure can be controlled by lateral ventilation of the shake-out grilles. Casting cleaning operations involve non-silica abrasives and these operations are not believed to be medically significant. Chipping magnesium castings does not seem to produce measurable amounts of respirable dust.

Engine castings are frequently inspected by x-ray. With modern industrial x-ray apparatus of the type used in the aviation industry, no radiation hazard to personnel will exist if the equipment is properly maintained, and operated in accordance with the manufacturer's instructions.

Pencil-like pocket chambers are readily available and can be worn by employees charged with operation of these units. Experience has shown that with properly designed equipment, the daily exposure need not exceed .01 roentgen which is 10% of the maximum permissible level suggested by the American Standards Association and the National Bureau of Standards.

Fluoroscopic equipment is sometimes difficult to maintain, particularly where parts are moved through the equipment on automatic conveyors. Constant vibration tends to increase the possibility of scattered radiation through defective joints in the shielding and requires periodic study with radiation instruments. In addition faulty design of the tunnels through which the conveyors pass is frequently the source of scattered radiation.

It has been shown that splinters of magnesium metal embedded in the skin are capable of reacting with tissue fluids and liberating hydrogen gas. Gas tumors can be readily produced in experimental animals by embedding magnesium beneath the skin, and can be expected to occur occasionally in workers who machine magnesium metal, if minute pieces of magnesium escape attention in wound cleansing procedures. These gas tumors are in fact quite rare. The author followed closely the experience of two large magnesium machine shops for more than five years, during which no such cases were reported. On the other hand, a few cases have been described among magnesium workers, and shops in which magnesium is machined should be alert to this hazard.

The testing of aircraft engines involves potential exposures to excessive noise, carbon monoxide and mercury vapor.

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In properly designed test cells, both noise and carbon monoxide are well controlled. On the other hand, without the provision of adequate insulation against noise, and ventilation of exhaust gases, highly objectionable conditions can exist and have existed in test areas.

It is generally stated that noise levels in excess of 80 decibels can produce impairment of hearing over a period of time. Levels in excess of 100 decibels were common in test cells of older design, and definite impairment to hearing has been reported among personnel with many years of exposure. In test cells of modern design, the noise levels are well below 75 decibels.

The tremendous volume of exhaust gases involved in engine testing must be exhausted to a safe disposal point. In the control rooms of well designed test cells, no detectable carbon monoxide need be present. In older, poorly designed plants, carbon monoxide has been known to reach harmful levels, and a number of asphyxiations have occurred.

Mercury vapor is insidiously present in the control rooms of engine testing departments. A large number of manometers are used in these rooms and occasional mercury spills result in the impregnation of floors and surfaces with minute globules of this metal. Mercury at room temperature has an appreciable vapor pressure and excessive concentrations are frequently present because spilled mercury is not recovered immediately.

Concrete floors are inadvisable where mercury is handled because of the ease with which the tiny droplets permeate the floor, and the subsequent difficulty in cleansing. Impervious flooring should be provided, spills should be minimized, and employees instructed to recover spilled mercury immediately.

Concrete floors which have been impregnated with mercury cannot be cleansed by ordinary means. It has been shown that the metallic mercury can be converted into the non-volatile sulfide by scrubbing the floors with sulphur compounds. The Bureau of Mines recommends a solution in which calcium polysulfide is the active agent, but agricultural grade elemental sulphur has proved to be satisfactory.

Airplane Manufacture

THE forming and assembling of intricate aluminum shapes involve a number of special problems, not the least of which is that of excessive noise from the many forming and riveting operations. Here again, as in engine testing, noise levels of harmful intensity have been shown to exist. Isolation of many of the operations by placing them in acoustic booths is successful in reducing the general shop noise level, but does not greatly assist the individual operator who must work within the acoustic insulation. Ear plugs of various kinds have been devised for protection of the individual worker, and are considered by many to be effective.

In addition to the effects from excessive noise, the vibration from pneumatic riveting tools used in aircraft assembly has been known to produce painful inflammation of the hands.

The design of proper paint spraying equipment, and strict supervision over the choice of solvents and thinners are of considerable importance to this branch of the industry.

Application of the primer coat often involves exposure to zinc chromate which is known to produce upper respiratory irritation and dermatitis. In normal times, toluol is used as a solvent for this primer, but in the event of war, the need for toluol in explosives manufacture precludes its use as a solvent, and when toluol is not available, the use of benzol should be guarded against. Benzol was introduced for a short period of time during the last war, but the hazard was quickly recognized and a suitable petroleum solvent substituted.

Toluol, because of its chemical relationship to benzol, was at one time regarded as a highly toxic material, but experience over many years has shown that its toxicity is of a very much lower order of magnitude.

Spray painting in aircraft assembly plants presents many special problems because of the large size of the objects which must be painted. Small parts which can be placed in conventional spray booths are no problem, but nobody as yet seems to have devised a completely satisfactory arrangement for fuselages and wings. Immense booths have been used and are successful in so far as they confine the mist within the booth, but the nature of the work is such that ventilation is of little value in protecting the men who must work within the enclosure. Where groups of men spray the same fuselage, top ventilation, or down-draft through grilles in the floor of the booth, are more practical than lateral exhaust through the end of the booth because in the latter case, men spraying near the open end of the booth are protected, but mist from spray guns will be carried into the breathing zone of men spraying near the closed end. For large spray booths, airline respirators or paint spray hoods should be provided for the personnel.

The plating room hazards are by no means unique to this industry, with the possible exception that a considerable amount of anodizing makes the chromic acid exposure doubly important. Anodizing is performed in electrolytes of sulphuric or chromic acid, and, from the health point of view, only the latter is significant. Chromic acid mist from plating or anodizing operations can be satisfactorily controlled, and lateral exhaust ventilation at a rate of 100 cfm. per square foot of tank surface is more than adequate to control the mist. A number of anodizing tanks installed with push-pull ventilation systems have been observed, but this method of ventilation is not believed to be good practice for most kinds of plating and anodizing. The jet of air from the "push" slot, with the entrained mist, is often deflected into work rooms by the metal parts suspended for treatment.

The addition of a small percentage of alumium to beryllium produces an alloy which has a number of uses in the aviation industry. During the past few years, we have become increasingly aware of the unusual toxicity of beryllium, and a number of inquiries have been raised as to the extent of this hazard in the aviation industry.

The author knows of no cases of beryllium poisoning in this industry or, for that matter, in other industries where aluminum beryllium alloys are used. However, this disease is characterized by insidious, delayed onset and it is too early to say that there is no hazard associated with the use of this material.

Propeller Manufacturing

THERE are no unusual occupational disease hazards incidental to propeller manufacturing.

The considerable amount of grinding calls for ingenious ventilation designs, but the abrasives used in these operations do not contain free silica and it has not been clearly demonstrated that prolonged inhalation of these dusts will produce injury to the health.

General Potential Health Hazards

THERE are a number of potential health hazards which are common to plants manufacturing engines, propellers or assembled aircraft. These exist in consequence of the fact that these are metal working plants.

Many solvents are used for metal cleaning. The most widespread is trichlorethylene used in commercially manufactured degreasing units.

Trichlorethylene is the most commonly used of the various solvents employed in degreasers and it is the basic ingredient of solvents sold under various trade names. The various commercial brands vary somewhat as to the type of inhibitors and stabilizers used to prevent the solvent from breaking to form hydrochloric acid, and sometimes phosgene. This breakdown is in itself probably of no medical significance under ordinary circumstances, although enough hydrochloric acid to manifest itself as a mild atmospheric irritant is sometimes observed in the vicinity of badly operated degreasers.

The hazard from the degreasing operation which concerns us most is that of inhalation of the solvent vapors. This can be divided into two types of exposure: first, the prolonged inhalation of low concentrations of vapor during regular operation of the unit; and, second, the breathing of relatively high concentrations for a short period of time, as would be true if an employee were required to enter a degreasing unit for cleansing or repairs. The two problems presented are different as to the effects produced on the body and in the precautions which must be taken to safeguard the health of workmen.

Exposure to high concentrations produces acute symptoms which are well understood (trichlorethylene has been used in medicine as an anesthetic), but the effects of prolonged exposure to subacute concentrations of this vapor are not entirely clear, although it is generally believed that this solvent, like other chlorinated hydrocarbons can produce liver damage. Most authorities specify 200 parts per million parts of air as the maximum safe concentration for continued exposure to the vapors of this solvent. If the manufacturers' operating instructions are followed, employees working at or near a well designed degreaser will not be exposed to concentrations in excess of this figure.

Cleaning or repairing degreasers may involve the entry of employees into the tank, and measures must be taken to protect them against the lethal concentrations to which they may be exposed. In high concentrations, the vapors act as a depressant on the central nervous system and can produce unconsciousness or death in a short while. In large degreasers, it is possible that so much vapor is present, that an oxygen deficiency may exist, thus adding the possibility of asphyxiation to the hazard from the vapor's toxicity. The manufacturer of the degreaser should be consulted for the precautions which should be followed prior to and during entry of the tank. Briefly, these should consist of allowing the solvent to cool, opening all manholes and doors, and providing the employees with a hose type respirator. Chemical cartridge type respirators or gas masks *will not* safeguard the employee if an oxygen deficiency exists; hence, the need for an airline or hose type respirator. A safety belt tended by another employee should be worn by persons entering a degreaser tank.

Carbon tetrachloride, because of its excellent solvent characteristics, is commonly used in aircraft plants, but its use should be discouraged in favor of less toxic solvents.

It is common practice to mix carbon tetrachloride and naphtha in the belief that by so doing the flash point of the naphtha can be elevated to a safe temperature. This procedure is not a sound one because of the relative rapidity with which carbon tetrachloride will evaporate, leaving a solvent of increasing naphtha content and progressively decreasing flash point.

Most plants keep carbon tetrachloride on hand for use in fire extinguishers and it is common practice for employees wanting a good solvent to draw on this material. This practice can be stopped by installing appropriate controls at the storeroom.

The bright-dip solutions used in metal finishing departments involve an exposure to nitrous fumes, and fatalities from breathing the fumes from these solutions are not rare. Under some operating conditions the brown oxides of nitrogen may be given off in sufficient concentration to cause death from delayed pulmonary edema.

A severe hazard may exist when crocks or carboys of nitric acid are broken. Fatalities have resulted where men have attempted to flush down spilled nitric acid, and there is ample evidence to support the recommendation that all employees should leave the scene of such a breakage until the acid has been thoroughly flushed by employ-

ees provided with gas masks approved for the acid gases.

Crocks of nitric acid mixtures should be kept in a water-filled dike as a precaution against breakage. Carboys should be handled carefully with the aid of a practical carboy jig. The crock of acid used for bright dipping should be provided with a lateral exhaust to dispose of the nitrous fumes given off by the operation.

Summary

THE standards of occupational hygiene maintained in the aircraft industry are high, but there are a number of potential health hazards which should be recognized.

Engine manufacturing involves exposure to fluorides, sulfur dioxide, x-ray, carbon monoxide, mercury vapor and excessive noise. The machining of magnesium involves a hazard from splinters of metal which have been shown to be capable of producing gas tumors, if imbedded in tissue.

In airplane manufacturing assembly, harmful effects have been reported from excessive noise, and the vibration of pneumatic riveting tools. The design of proper paint spraying equipment is important, although the solvents for general use have a relatively low order of toxicity. Exposures from chrome plating, anodizing, bright dip, and degreasing should receive attention.

Still a Selling Job to Do

SUDDENLY, there has been a great awakening upon the part of top industrial management generally to the all-powerful force called "human relations," or the human factor in production. This force, greater than atomic power, has been largely overlooked, obscured by the old "master-servant" philosophy which is now as obsolete and impractical as the pyramids. We are finding that production comes from people, not machines. "Human relations" has become a by-word but it is a nebulous, ethereal term. Specifically, how does a company go about improving its human relations? Comprehensive industrial health programs afford one tangible tool because industrial health is concerned with flesh and blood and brain. To give but one support for this statement, a large corporation finds that 85% of the calls upon its medical department come from only 30% of the plant population. A good portion of that 30% is made up of people who have mental rather than physical ills, troubles at work and at home, worries and heartaches. Incidentally, it has been found that one out of every 15 workers per shift will visit the medical department regardless of the industry. This gives a glimpse of the opportunity that industrial health offers for improving human relations. It is apparent that the world is in the midst of a social revolution. We need only look at Europe for the proof of that, if it is necessary to look that far from home. In the United States the average so-called common man has more comforts and advantages than the royalty of a few hundred years ago who lived in windswept castles surrounded by garbage and bounced in wooden wagons over rutted roads. We make what men want, the comforts of life; something over 50% of the world's productive capacity is ours and we sell what we make for a profit. But, in spite of all this, apparently we have failed to sell our system, the organization of government and economy which has made our country the poor man's paradise. Most of us learned that the proof of the pudding is in the eating—evidently it is not. There is still a "selling job" to do and the time is today. One of the best ways of doing that job is by increased intelligent attention to people. And one of the best ways of doing that is by increased attention to industrial health.

—From "What's Happening in Industrial Health," by JOHN F. MCMAHON, in *Advanced Management*, December, 1948.

The Creation of Promotional Posters

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PICTORIALIZATION of promotional ideas dates back to the cave man, who used pictures to convey messages before the advent of the written word. Later in history, when the written word had been developed, pictures continued to be used extensively, because education had not yet spread to the masses. Today, even though learning has spread to include the majority of civilized people, pictorial education retains its importance, but in quite a different manner. It is now used to direct the thoughts and actions of individuals who can read, but who do not take time to inform themselves.

Posters, a form of pictorial information, are very useful in educating and influencing people, probably rating third with radio and newspapers. Many countries all over the world use them to persuade people to act on subjects of interest to the state, to influence peoples' choice in politics, to arouse them for or against other regimes, to sell government securities, and to increase enlistment in the army. Merchants, manufacturers and businessmen also use this method as one way to stimulate sales of their products. Educators recognize the power of this medium in persuading people to act on subjects about which they have not been technically informed. Also, it is employed to induce people to investigate matters important to themselves or their associates, thereby bringing to their attention things which may have been neglected, and to supply information to technical people concerning methods not included in their specific training. There are many uses for posters but the design and purpose are generally the same; therefore, these aspects of the poster require consideration.

The design of the poster can be broken down into nine steps:

1. Distribution of the poster.
2. Subject of the poster.
3. Gathering data.
4. Developing an idea.
5. Selection of illustration.
6. The text of the poster.
7. Color in the design.
8. Checking the poster.
9. Making the finished poster.

Each step will be considered separately, in its proper sequence.

Distribution of Poster

BEFORE designing a poster, the artist must decide two things; first, the locations used in distribution; second, the size which will show the poster to the best advantage.

The distance the poster is to be seen will govern the size. The location of the poster will determine how much time the person will have to receive the message. A highway bulletin (outdoor poster) message must be received at a glance with not over 10 words to read. A person who is driving a car can take his eyes off the road but a few seconds; therefore, the illustration must be big and simple, such as the head of a figure, a foot or hands.

On posters placed in locations where people may stop and read, the copy may be longer. The poster which has the longest reading time should be placed in waiting rooms or on buses, trains or streetcars, where a person who is waiting may be looking for something to help pass the time. Yet, under all circumstances, the copy must be brief and to the point.

Subject

THE subject is usually selected by a client or department head. In many cases the artist must choose the subject; at any rate, he should follow a definite pattern in selecting a subject to be publicized.

The subject should be clear and to the point, with the stress on one idea only. The illustration should be simple; the copy should be short and quickly understood, setting forth a convincing argument which is amplified and substantiated by the picture. Above all, the subject must have sound appeal. Particular care must be taken not to offend any group or creed of people. When directing the information to either sex, the artist must understand men or women, so that his message will not have a negative appeal.

Gathering Data

BEFORE gathering data on the subject, the artist should get the idea of his client clearly in mind, because a failure to do this may lose the artist considerable time and energy in pleasing the client, who may have quite definite ideas on the subject. There are many ways of gathering material on the subject the artist intends to use in a poster. His client may supply him with some material, or he may have to secure what he wants first hand. The local library is very useful. Many times the nature of the subject will suggest possible places to secure needed information.

Developing an Idea

THE artist never knows just how long it will take to develop an idea, so it is wise for him to allow as much time as possible for this purpose. He must not let his poster suffer in crafts-

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manship for lack of time. He should use one idea at a time, and not try to attempt too much. He should endeavor to develop something novel and different in application.

Many sketches should be made of a potential poster before an idea is finally selected for development.

Here are 10 points which may be used to develop a poster:

1. Excite curiosity and interest.
2. Assume the reader is in a hurry.
3. Create a desire.
4. Induce the reader to consider the matter.
5. Create an argument sound in appeal.
6. Develop personal appeal.
7. Develop general appeal.
8. Direct the theme to an individual.
9. Direct appeal to a sex.
10. Leave something for the reader to fill in or activate within himself.

Selection of Illustration

THE illustration should occupy about 90% of the poster space. The subject of the poster will suggest the treatment to be used, i.e., realistic or abstract art. Here are 33 different types of appeals for illustrations:

1. Romance.
2. Action.
3. Family.
4. Child.
5. Beauty.
6. Realism.
7. Excitement.
8. Pleasure.
9. Pride.
10. Horror.
11. Comedy.
12. Sex.
13. Fear.
14. Characterization.
15. Symbolism.
16. Abstraction.
17. Distortion.
18. The unusual.
19. Futurism.
20. Historical period.
21. Prediction.
22. Before-and-after contrast.
23. Appeal to the senses.
24. Desire.
25. Imagination.
26. Love.
27. Hope.
28. Venture.
29. Envy.
30. Heroism.
31. Variety.
32. Kindness.
33. Gaiety.

Illustration with copy may be classified into two groups:

1. Illustration conveying a message, with copy used as support.

2. Illustration used to attract attention, the copy being used for conveying a message.

The illustration should be kept simple and as few figures used as possible. If part of a figure will put across the idea, use it only. Composition of a poster is accomplished in the same manner as any illustration, with a single exception, in that the poster copy is part of the design. Areas should be distributed in an interesting pattern of tone value, but should be unequal in area and tone value.

Text of the Poster

THE text should be simple and easy to read, and 10 seconds is a good yardstick for reading time. The contents should be clear and easily understood. It may be preferable to use a slogan or a phrase, for the illustration may be based on a slogan as the main theme.

People are accustomed to reading newspapers and books which are printed in lower case letters, therefore, it would be logical to design the poster using lower case letters as much as possible. Never is it permissible to use a type of letter

which is hard to read. With these limitations one can be free to use a variety of type, but the type face must always be in keeping with the theme of the poster.

Color in the Design

COLOR should be worked into the area of composition, and each color should occupy a different sized area. When using four colors, the artist should make one warm and three cool, or one cool and three warm. Each color used should have a different shade value. Never use three primary colors in full intensity; one may be of full value, but the others must be subdued in hue and different in tone value.

One should be economical in the use of colors, using as few as possible, as printers charge for each additional color used. When designing a poster for silk screen the artist can gain the cost of a color by lapping colors. That is, if there are three colors involved, yellow, blue and green, he can gain the color green by lapping yellow over blue. In this case he is charged for only the two colors, yellow and blue.

Checking the Poster

WITH a final "rough-up," including all the steps up to this point, one can check it then against the following points:

1. Can it be read quickly?
2. Is the illustration as simple as possible?
3. Will it stand out from its surroundings?
4. Is the copy as short as possible?
5. Does it convey the message clearly?
6. Are the colors pleasing and attractive?
7. Was it handled the best way?
8. Does it appeal to whom it was designed?

After making all the changes thought necessary, the artist should seek approval of the client or department head. If there are to be any changes, now is the time to do it, for once work is begun on the poster, no changes should be made but the work continued until completion.

Making the Finished Poster

ONE more step is necessary before the poster is ready to paint. The design is laid out in pencil on tracing paper very exactly, with every line being made to count. Horizontal and perpendicular lines are to be kept square with a triangle and a T-square. After having laid out the poster as accurately as possible, the artist should turn over the tracing paper and trace over the pencil marks. This will give him a chance to see the errors in the spacing of letters. By looking at an illustration in a mirror, or on the reverse side, one may see how well it is balanced.

After the artist has completed tracing the lines on the reverse of the drawing, it is ready for transfer. The tracing is mounted in position on the board where the painting of the poster is to be done. Using a large ball-point stylus, the pencil lines are traced over, with care being exercised to trace the portions that have been changed. When the transfer is thought to be complete, the artist should loosen two edges and ascertain if he has missed any lines. If any have been missed, the drawing can be put back in place and finished very simply. By using this method, the artist can keep the drawing clear, and free from smudges.

[NOTE: The illustrative posters on these pages are reduced from colored originals which were 14.5 to 15 inches by 19 to 20 inches in size.—ED.]

Summary

IN THE successful creation of promotional posters certain basic factors need be considered:

1. *Distribution:* The location of the poster will determine the size and the reading time of the poster.

2. *Subject:* A single idea is all that may be used at one time, therefore, it must be of sound logic and easily understood.

3. *The Gathering of Data:* The subject must be thoroughly understood and all data must be gathered before developing ideas.

4. *The Development of the Idea:* The idea should be something novel and attractive, with constant consideration being given good composition and design with plenty of appeal.

5. *Selection of Illustration:* Through use of realistic or abstract art one may use the illustration either to convey the message or to attract attention to the poster.

6. *Text:* The text should be worked into the design, with easy-to-read type. The copy must be short and to the point.

7. *Color in Design:* The color employed in the poster should be attractive and harmonious. As few colors as possible should be used with only one of the colors being given full intensity.

8. *Checking the Poster:* The poster should be checked for reading time, legibility of text, color attraction, clearness of subject matter and human appeal.

9. *Making the finished poster:* Before starting the finished poster all necessary changes should be made.

The above fundamentals will lead to the production of more intelligent, more appealing, more artistic posters that will motivate the reader into the desired channel of activity.

[NOTE: In health and medical services things are done for people; in health education people are urged to do things for themselves. Posters have long been used as a means of health education, in respect of which they can be powerful as reminders, timely as conveyors of suggestions, and persuasive toward right living in matters of health and safety. Their effectiveness, however, depends upon how they are made, and making them properly—as everyone who has tried it knows—is not easy. MR. WILLIAMS' article is offered in the hope that it will be helpful to some, at least, of the many in health education activities who are concerned with their preparation.—ED.]

"A Day in Modern Industry"

HIGH SCHOOL students had a good look at American industry recently, right from the inside—and liked it. It happened when, on November 30 last, 200 seniors from the New Brunswick and St. Peter's high schools, New Brunswick, New Jersey, took over the Johnson & Johnson plants, lock, stock, and barrel, to learn by actual participation how a major industrial enterprise operates. It was a Johnson & Johnson experiment in selling the American free enterprise system and acquainting tomorrow's workers with modern management. It proved such a success that plans are being made for even more elaborate industry days with high school students. The project—"A Day in Modern Industry"—first of its kind in manufacturing history, was originated by the firm's recreation manager, Vincent P. Utz, who adapted it from the "Mayor for a Day" plan. He expressed hope that the "J. & J. plan of working with high school seniors here will set a pattern for the rest of American industry." The students gathered in the company's power plant, from which J. & J. officials took them to their designated positions, in personnel, traffic, engineering, cotton mill, gauze mill, plaster mill, export, legal, and the numerous other departments. All races and creeds were represented in the second group. First appointment to be kept by 17-year-old president of the company, Frank Metz was a meeting with top management officers. He urged them on to "greater productivity. . . .especially on this day when Johnson & Johnson is in the capable hands of high school seniors."

—*Management Review*, January, 1949.

An Industrial Medical Library
—In A Community Hospital—

WHAT is believed to be the first presentation to a community hospital of an Industrial Medical Library took place at Saginaw, Michigan, recently when the managements of the General Motors plants in that city furnished the funds to bestow upon the Saginaw General Hospital the books here listed, together with subscriptions to INDUSTRIAL MEDICINE, the *Journal of Industrial Hygiene and Toxicology*, and *Occupational Medicine*. The physicians comprising the Saginaw General Motors group made the selections. In the words of one of them, "The idea behind the presentation is that any library segregated to a plant is necessarily limited in its general usefulness, whereas placing a representative plant library in a community hospital makes it available to all of the physicians interested in industrial medical matters. In a teeming industrial center such as this there are many physicians so interested...."

It is the intention to add new texts and journals as they are published, so that this will be "indeed, a living library."

The picture, taken at the time of the presentation, includes (left to right): R. E. RAPER, Director of the Saginaw General Hospital; JAMES H. SMITH, General Manager of the Central Foundry Division of General Motors, and Chairman of the local Inter-Plant Committee, who made the presentation; DR. DONALD C. DURMAN, who as Chief of Staff accepted the books; WILLIAM H. DOERFNER General Manager of the Saginaw Steering Gear Division of General Motors; and DR. JOHN E. MANNING, Medical Director of the Saginaw Steering Gear Division.

The Library

Baetjer, Anna M.: WOMEN IN INDUSTRY—Their Health and Efficiency. Philadelphia: W. B. Saunders Company, 1946, 344 pp.

Brahdy, Leopold: TRAUMA AND DISEASE. (With Samuel Kahn.) Philadelphia: Lea & Febiger, 1937, 613 pp.

Bridges, Clark D.: JOB PLACEMENT OF THE PHYSICALLY HANDICAPPED. New York: McGraw-Hill Book Company, Inc., 1946, 329 pp.

Brodman, Keeve: MEN AT WORK—The Supervisor and His People. Chicago: Cloud, Inc., 1947, 191 pp.

Collier, Howard E.: OUTLINES OF INDUSTRIAL MEDICAL PRACTICE. Baltimore: The Williams & Wilkins Company, 1941, 440 pp.

Drinker, Philip, and Hatch, T. F.: INDUSTRIAL DUST —Hygienic Significance, Measurement and Control. New York: McGraw-Hill Book Co., 316 pp.

Dunbar, Flanders: PSYCHOSOMATIC DIAGNOSIS. New York: Harper & Brothers, 1943, 741 pp.

Ficklen, Joseph B.: MANUAL OF INDUSTRIAL HEALTH HAZARDS. West Hartford, Conn.: Service to Industry, 1940, 176 pp.

Hamilton, Alice: INDUSTRIAL POISONS IN THE UNITED STATES. New York: MacMillan, 1925, 590 pp.

Hueper, W. C.: OCCUPATIONAL TUMORS AND ALLIED DISEASES. Springfield, Ill.: Chas. C. Thomas, 1942, 896 pp.

International Labour Office: OCCUPATION AND HEALTH. Volume I: A-H Geneva: International Labour Office. 1930. 999 pp. Volume II: I-Z. Geneva: International Labour Office. 1934. 1310 pp. Supplement. Geneva: International Labour Office.

Jacobs, Morris B.: ANALYTICAL CHEMISTRY OF INDUSTRIAL POISONS, HAZARDS, AND SOLVENTS. Inter-Science Publishers, 1944, 661 pp.

Johnstone, Rutherford T.: OCCUPATIONAL MEDICINE AND INDUSTRIAL HYGIENE. St. Louis: Mosby Company, 1948, 604 pp.

Kessler, Henry H.: ACCIDENTAL INJURIES — The Medicolegal Aspects of Workman's Compensation and Public Liability. Ed. 2. Philadelphia: Lea & Febiger 803 pp.

Kuhn, Hedwig S.: INDUSTRIAL OPHTHALMOLOGY. St. Louis: C. V. Mosby Co., 1944, 294 pp.

Lanza, A. J., (Edited by): SILICOSIS AND ASBESTOSIS. By various authors. New York: Oxford University Press, 1938, 431 pp.

Lehmann, Karl B., and Flury, Ferdinand: TOXICOLOGY AND HYGIENE OF INDUSTRIAL SOLVENTS. Baltimore: Williams & Wilkins Co. 1943, 378 pp.

McBride, E. D.: DISABILITY EVALUATION—Principles of Treatment of Compensable Injuries. 4th Edition. Lippincott, 1948, 667 pp.

McCord, Carey P.: A BLIND HOG'S ACORNS—Vignettes of the Maladies of Workers. Chicago: Cloud, Inc., 1945, 311 pp.

McGill University: HUMAN BEHAVIOR AND ITS RELATION TO INDUSTRY. Montreal: McGill University, 1944, 204 pp.

McNally, Wm. D.: TOXICOLOGY. Chicago: Industrial Medicine Publishing Co. 1938, 1022 pp.

National Tuberculosis Association: INDUSTRY TUBERCULOSIS, SILICOSIS AND COMPENSATION. New York: National Tuberculosis Association, 1945, 126 pp.

Resnick, Louis: EYE HAZARDS IN INDUSTRY—Extent, Cause and Means of Prevention. New York: Columbia University Press, 1941, 321 pp.

Sappington, C. O.: ESSENTIALS OF INDUSTRIAL HEALTH. Philadelphia: Lippincott, 1943, 626 pp.

Schwartz, Louis: OCCUPATIONAL DISEASES OF THE SKIN. (With L. Tulipan.) Second Edition. Philadelphia: Lea & Febiger, 1947, 964 pp.

Teleky, Ludwig: HISTORY OF FACTORY AND MINE HYGIENE. Columbia University Press. New York 27.

Tiffin, Joseph: INDUSTRIAL PSYCHOLOGY. New York: Prentice-Hall, Inc., 1946, 386 pp.

U. S. Public Health Service: MANUAL OF INDUSTRIAL HYGIENE AND MEDICAL SERVICE IN WAR INDUSTRIES. Philadelphia: Saunders, 1943, 508 pp.

U. S. Manpower Commission, Region XII: PHYSICAL DEMANDS AND CAPACITIES ANALYSIS. San Francisco: Region ZII, U. S. Manpower Commission, May, 1944, 627 pp.

Wampler, F. J. (Edited by): PRINCIPLES AND PRACTICES OF INDUSTRIAL MEDICINE. Baltimore: Williams & Wilkins Company, 1943, 579 pp.

Program of the American Medical Association for the Advancement of Medicine and Public Health

A FEDERAL Department of Health: (1) Creation of a Federal Department of Health of Cabinet status with a Secretary who is a Doctor of Medicine, and the coordination and integration of all Federal health activities under this Department, except for the military activities of the medical services of the armed forces.

Medical Research: (2) Promotion of medical research through a National Science Foundation with grants to private institutions which have research facilities and personnel.

Voluntary Insurance: (3) Further development and wider coverage by voluntary hospital and medical care plans to meet the costs of illness, with extension as rapidly as possible into rural areas. Aid through the states to the indigent and medically indigent by the utilization of voluntary hospital and medical care plans with local administration and local determination of needs.

Medical Care Authority with Consumer Representation: (4) Establishment in each state of a medical care authority to receive and administer funds with proper representation of medical and consumer interest.

New Facilities: (5) Encouragement of prompt development of diagnostic facilities, health centers and hospital services, locally originated, for rural and other areas in which the need can be shown and with local administration and control as provided by the National Hospital Survey and Construction Act or by suitable private agencies.

Public Health: (6) Establishment of local public health units and services and incorporation in health centers and local public health units of such services as communicable disease control, vital statistics, environmental sanitation, control of veneral diseases, maternal and child hygiene and public health laboratory services.

Mental Hygiene: (7) The development of a program of mental hygiene with aid to mental hygiene clinics in suitable areas.

Health Education: (8) Health education programs administered through suitable state and local health and medical agencies to inform the people of the available facilities and of their own responsibilities in health care.

Chronic Diseases and the Aged: (9) Provision of facilities for care and rehabilitation of the aged and those with chronic disease and other groups not covered by existing proposals.

Veterans' Medical Care: (10) Integration of veterans' medical care and hospital facilities with other medical care and hospital programs and with the maintenance of high standards of medical care, including care of the veteran in his own community by a physican of his choice.

Industrial Medicine: (11) Greater emphasis on the program of industrial medicine, with increased safeguards against industrial hazards and prevention of accidents occurring on the highway, home and on the farm.

Medical Education and Personnel: (12) Adequate support, with funds free from political control, domination and regulation, of the medical, dental and nursing schools and other institutions necessary for the training of specialized personnel.

Beryllium
—Health Hazards in the Extraction of Beryllium Oxide from Beryl and Beryllium Alloy Manufacture—

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THE rare metals have attracted the attention of the industrial hygiene profession, and beryllium, while not as rare as the older textbooks indicate, has been no exception. The interest in the toxicity of beryllium has been revised of late years largely as a result of the increased uses of some of its compounds; and, because of the 17 cases of delayed chemical pneumonitis among persons who had an exposure to beryllium compounds as reported by Hardy and Tabershaw.[1]

Unfortunately there appears to be a dearth of information concerning the atmospheric concentration of beryllium in the dusts to which some industrial workers are exposed. Titus[2] has reported on exposures to beryllium in the machining of a beryllium alloy steel, but because of the large size of the particles encountered in his study the toxic potentiality of such exposures may be minimized. With reference to those industrial dust exposures of hygienic significance there is no quantitative information concerning the concentration of beryllium encountered.

In 1943 we were requested to investigate the potential health hazards associated with the extraction of beryllium oxide from beryl in an industrial establishment in Pennsylvania engaged in the manufacture of copper-beryllium alloys. Fairhall[3] and his co-workers had just previously concluded as a result of their extensive studies that beryllium of itself was not toxic and that any toxicity assigned to beryllium salts was due to the acid radicals of its compounds. Beryllium, they reported, acted merely as an adjuvant. Therefore, in our original investigation we did not make any attempt to measure the exposure to beryllium but rather we made our evaluation on the extent of exposures to the acid radicals of the beryllium compounds. In our latest investigation, the preliminary results of which we shall present, we decided to make the additional beryllium determinations. It is the purpose of this paper, therefore, to offer evidence which may contribute to the store of knowledge concerning beryllium and its possible toxicity.

The atmospheric dusts were collected with the Greenburg-Smith impinger using distilled water as a collecting medium. The beryllium content of the dust was determined by employing the reagent "curcumin" as recommended in Snell's "Colorimetric Methods of Analysis." Fluorides were determined by the Willard and Winter distillation method with the subsequent titration of the distillate with thorium nitrate. Settled dust samples were secured from the ledges and beams and analyzed for their beryllium and fluoride content although no attempt has been made to correlate these results with atmospheric findings.

The oxides of nitrogen were collected in fritted glass bubblers using sulfuric acid as a collecting medium and employing the phenoldisulfonic acid method of analysis.

As previously stated, the plant under investigation was engaged in the manufacture of beryllium oxide and copper-beryllium alloys. Briefly the process involved[4] may be described as follows:

The beryllium ore, beryl, was crushed and wet ground in a ball mill. In a Lancaster mixer the wet ore was mixed with soda ash and sodium fluo-silicate and briquettes of the resulting mixture were sintered in a furnace for approximately one hour at 750° C. The reaction in the furnace caused the formation of soluble sodium beryllium fluoride which is the only soluble portion of the sinter. The fired briquettes were then crushed, wet ground in a ball mill and the soluble sodium beryllium fluoride extracted with water. The resulting solution was then treated with caustic soda with the formation of beryllium hydroxide as a precipitate. This was separated in a filter press and placed in a calcining furnace for conversion into beryllium oxide.

The copper-beryllium alloys were prepared by intimately mixing together beryllium oxide, copper oxide and carbon powder and charging this mixture into an electric arc furnace. The balance of the furnace charge was composed of pure copper. The resulting melt, known as the master alloy, was subsequently remelted with more copper in coke fired crucible furnaces to produce a copper-beryllium alloy containing approximately 1.5-2.0% beryllium.

Investigation of the exposures at the primary ore crusher indicated that during the loading of the crusher the workmen were exposed to the dust from the beryllium ore, beryllium aluminum silicate. Four atmospheric dust samples collected at the breathing level while charging (Table I) indicated an average concentration

of beryllium equal to 1.3 mg. per cubic meter of air. Dust counts (Table II) on four samples averaged 8.4 million particles per cubic foot of air—the minimum being 3.2 million and the maximum equal to 10.8 million. Free silica in the atmospheric dust could not be demonstrated. The settled dust on the rafters and ledges (Table III) contained 8.8% beryllium oxide and 1.06% fluorine although atmospheric fluorides were not demonstrated in our air samples. Their presence in the settled dust is readily explained for it resulted from a reclamation process. At no time during our investigation however, was this fluorine material added to the crusher. This form of fluoride reclamation has been discontinued.

After the wet grinding of the ore it was batch mixed in a Lancaster mixer which was located on a balcony. Here the ore was mixed with the soda ash and sodium fluosilicate and on completion of the mixing it was dropped to the briquetting table below where it was spread over briquette forms and compressed with a pneumatic tamper. The wet briquettes were then ready for delivery to the sintering department.

The operator of the Lancaster mixer weighed relatively large quantities of soda ash and sodium fluosilicate into the mixer causing him to be exposed to a fluoride dust.

The fluoride concentration in the two atmospheric samples collected (Table I) averaged 2.31 mg. per cubic meter of air, being only slightly below the maximum allowed. The beryllium concentration of the atmospheric dust was low as would be expected due to the wetted nature of the ground beryllium ore from the wet mill. In the two samples collected it ranged from zero on one sample to .014 mg. per cubic meter of air on the other. The settled dust samples contained 12.36% fluorine and 7.4% beryllium oxide (Table III).

Atmospheric samples at the briquetting table (Table I) under the Lancaster mixer indicated fluoride exposures to concentrations averaging 1.34 mg. per cubic meter of air, both samples representing concentrations below the maximum allowed. Analysis of two other samples at this point did not reveal the presence of beryllium.

In the sintering department the wet briquettes were placed on carts for passage through the furnace. The entrance and exit of the furnace were provided with canopy hoods for the removal of the gases and fumes generated. On completion of the required firing (about one hour at 750° C) the cart was pushed to a floor hopper and the sintered briquettes were dumped and carried by an enclosed chain conveyor to an elevated storage hopper located in an adjoining room.

At this point of the extraction process, the beryllium is in the form of the soluble sodium beryllium fluoride. Two atmospheric dust samples (Table I) were collected at the discharge end of the furnace in the vicinity of the floor hopper and on analysis indicated atmospheric concentrations of fluorides averaging 7.75 mg. per cubic meter of air, approximately 3½ times the accepted maximum allowed. Two samples were also collected for beryllium determinations and these indicated an average concentration equal to .59 mg. of beryllium per cubic meter

TABLE I.
ATMOSPHERIC BERYLLIUM AND FLUORIDE CONCENTRATIONS

Operation	Milligrams Per Cubic Meter of Air	
	Fluorides	Beryllium
Crushing beryl ore	—	1.3
	—	1.3
	—	1.3
	—	1.3
Lancaster mixer	1.80	0.014
	2.83	0
Briquette table	1.51	0
	1.17	0
Sintering and dumping of sintered briquettes	5.90	0.582
	9.60	0.617
Sintered briquette crusher	2.00	0.706
	10.60	0.653
Calcining furnace:		
Loading	0	0.117
Unloading	0	0.888
Detroit furnace department	2.01	—
	0.73	—
	0.51	—
	0.88	—
Ajax furnace department	8.84	—
	6.07	—
	2.01	—
	2.85	—
Foundry department	0.32	0.044
	0.17	0.046

The maximum allowable concentration for fluorides is 2.5 milligrams per cubic meter of air. No maximum allowable concentration has been established for beryllium.

TABLE II.
DUST CONCENTRATIONS FOR ORE CRUSHING AND FOUNDING

Operation	Dust Count Millions of Particles per cu. ft. of air
Crushing beryl ore	10.8
	10.0
	9.6
	3.2
Foundry:	0.2
Molding, pouring and shakeout	0.3
	0.1
	0.4

TABLE III.
FLUORINE AND BERYLLIUM CONTENT OF SETTLED DUST

Location	% Fluorine	% Beryllium Oxide
Beryllium ore crusher room	1.06	8.8
Wet milling of ore	1.88	8.1
Lancaster mixer	12.36	7.4
Sinter furnace room	13.47	4.8
Sinter crusher	17.74	5.9
Calcining department	1.94	77.4
Arc furnace department	1.69	35.9
Detroit furnace department	0.60	17.8
Ajax furnace department	5.64	4.2
Foundry, molding area	0	2.0
Foundry, melting area	0	9.4

TABLE IV.
ATMOSPHERIC CONCENTRATION OF OXIDES OF NITROGEN

Operation	Parts of Oxides of Nitrogen per million parts of air
Cadmium plating:	125.6
Flash dip tank	109.1
	145.2
	106.4
Splicing table	41.6
On platform	21.3
	49.5
	43.2
Pickling room	63.5
	13.5
At nitric acid tank	35.2
	20.2
	13.8
General room air	20.5
	73.9
	21.3

The maximum allowable concentration for oxides of nitrogen is 25 parts per million parts of air.

of air. Settled dust samples collected in the sinter furnace room contained 13.47% fluorine and 4.8% beryllium oxide (Table III).

Prior to extracting the sodium beryllium fluoride, the sintered briquettes were first crushed in a jaw crusher. The storage hopper funnel feeding the crusher clogged frequently owing to the difficult passage of the relatively large briquettes. This condition required the attention of the wet mill operator making it necessary for him to remove the obstruction and exposing him to the dusts of the sintered briquettes. Investigation disclosed that the atmospheric concentration of fluorides at this point ranged from 2 to 10.6 mg. per cubic meter of air and beryllium concentrations averaged .68 mg. per cubic meter of air (Table I). Settled dust samples contained 17.74% fluorine and 5.9% beryllium oxide (Table III). Fortunately however, approximately only one hour per day was spent in this location by the operator and then he wore a cotton gauze filter respirator of doubtful efficiency.

The next dust generating operation in the process was at the calcining furnace where the wet filter cake of beryllium hydroxide was burned and reduced to beryllium oxide. The exposures here were primarily to beryllium oxide. Atmospheric samples were collected during the loading and unloading of the furnace (Table I). Analysis of the four samples collected indicated the absence of a fluoride exposure at this location whereas the operator was found to be exposed to 0.117 mg. of beryllium per cubic meter of air while loading the furnace and 0.888 mg. of beryllium per cubic meter of air during the unloading process. Settled dust samples (Table III) contained 1.94% fluorine and 77.4% beryllium oxide.

Unfortunately the arc furnaces employed for the preparation of "master" alloy were down for major repairs at the time our samples were being collected and it is only recently that they have been placed in operation. Therefore, we were not able to collect samples or evaluate the exposures in this department. Settled dust samples collected here indicated a concentration of fluorides equal to 1.69% and the beryllium concentration, calculated as beryllium oxide was equal to 35.9% (Table III).

In the small foundry "master" alloy was remelted with additional copper for use in ingots, spark proof hand tools and miscellaneous castings. During our investigation, foundry production was at only a fraction of capacity. However, some small heats were being made. Two samples of the general atmosphere while pouring indicated an average cencentration of fluorides equal to 0.24 mg. per cubic meter of air. Beryllium was also found in the samples and averaged 0.045 mg. per cubic meter of air. Both the beryllium and fluoride concentrations were low. Likewise, dust counts were low in the molding area averaging 0.25 million particles per cubic foot of air, on four samples. Settled dust samples in the melting area contained no fluorine and 9.4% beryllium oxide. In the molding area the settled dust contained 2% beryllium oxide.

It was observed that serious local contamination of the room air was occasioned by the escape of fluoride fumes from nearby Ajax induction furnaces. These furnaces were being used as reaction vessels and while provided with local exhaust ventilation, quite frequently it was observed that the reaction in the furnace was so violent as to cause the escape of large quantities of dense white fumes containing fluorides. These were carried by room air currents to various sections of the melting department. They caused temporary severe exposure to highly contaminated air. The escape and line of travel of these fumes was unpredictable so that we could not measure the extent of exposures. We were able, however, to locate our sampling equipment in the vicinity of the operator of this furnace. In four samples analyzed for fluorides we found concentrations ranging from 2.01 to 8.84 mg. of fluorides per cubic meter of air, the average being 4.94 mg. per cubic meter. Settled dust samples contained 5.64% fluorine and 4.2% beryllium.

In the Detroit arc furnace department, scrap copper beryllium alloy was remelted and poured into pigs and ingots. These are rocking furnaces and the fumes from these were removed from the room by powered roof ventilators A total of eight air samples were collected in this department and analysis of four of these indicated an average fluoride concentration equal to 1.03 mg. per cubic meter of air (Table I). The presence of beryllium in the other four air samples could not be demonstrated. Settled dust samples (Table III) contained 0.6% fluorine and 17.8% beryllium oxide. While fluoride containing materials were not used in this department the presence of fluorides could be accounted for as a result of the contamination of the room air by the exhaust gases and fumes of the Ajax furnaces which were discharged on the low roof of the adjoining

building. It was visibly evident that the stack discharge was contaminating the Detroit furnace room.

PERHAPS the most hazardous exposures in the entire plant were encountered as a result of the use of nitric acid in the plating and metal cleaning departments After the cold rolling of copper beryllium bars into coiled strips they were in many instances cadmium plated. The operation was conducted as a continuous process by passing the strip through the cadmium plating bath. Prior to the plating, the strip was bright dipped in a nitric acid bath on the same unit. Local exhaust ventilation was not provided. The brown nitrogen peroxide escaping was quite noticeable and at the workers' breathing level in the vicinity of the nitric acid bath of the strip plater, four samples were collected for oxides of nitrogen They averaged 122 parts per million—approximately five times greater than the presently accepted maximum allowed. Exposure at this point was only intermittent and each time of short duration. At the splicing table, however, which was the operator's usual work position, the concentration represented by four samples was equal to 38.9 parts per million —slightly above the maximum allowed. This department was well removed from the oxide extraction and melting departments so that beryllium was not suspected as an additional atmospheric contaminant.

Exposures to oxides of nitrogen also prevailed in the metal cleaning or pickling process. Large nitric acid bright dip tanks were employed in the cleaning of copper beryllium rods and strip. The average concentration represented by eight samples collected for oxides of nitrogen equaled 32.95 parts per million, ranging from 13.5 to 73.9 parts per million.

THE foregoing information has been presented so that the industrial hygiene profession in general may be made acquainted with the order of magnitude of atmospheric beryllium concentrations encountered in one industrial establishment. It is obvious that known irritant and toxic agents in addition to beryllium were encountered; and, in not a few of the locations investigated, the atmospheric concentration of these toxic agents exceeded the present maximum allowed concentrations for these substances Pending the publication of factual evidence that beryllium is a toxic agent in itself, the recommendations offered by our Bureau were designed to reduce the fluoride and nitrogen oxide exposures. It is believed that the medical experience of the plant will evidence the reasons for this action.

Medical Findings

CONCURRENT with the collection of atmospheric samples at the plant investigated, the results of which have just been described, we undertook to evaluate the medical records of the plant in terms of treatments for conditions referable to the lungs by departments. We also examined all of the employees of the plant with our 70 mm. x-ray unit. Our examination of the dispensary records covered a two-year period; and, as a result of that examination, it was indicated that all cases reporting to the dispensary for treatment, with symptoms referable to the respiratory tract, were in persons employed in the melting department or in the pickling room. These records also indicated that during the past two years there had been one case with symptoms involving the lungs reported from the beryllium oxide extraction departments.

Pickling Department

AS HAS been previously indicated, the exposures in the pickling room were to oxides of nitrogen. The samples collected on analysis ranged from 13.5 to 73.9 parts per million. The records revealed that in the past two years, three persons from this department reported to the dispensary with symptoms referable to the lungs. One case terminated fatally. The occupational history on this fatal case is interesting, particularly in view of the statements in the dispensary record which indicated "that death was due to beryllium fluoride poisoning." This man had been employed at the plant since 1942. He spent only nine days of 1942 in the beryllium oxide extraction department. With the exception of these nine days, from 1942 until he expired in April, 1947, he was employed as a cleaner in the pickling room. One year prior to his death his chest x-ray, taken at the Community General Hospital, was negative. On the records, this is a death due to beryllium fluoride exposure, yet his history reveals no exposure to beryllium fluoride in the five years previous to death. In the other two cases which had been referred to the dispensary from this department, the x-rays were clear after the acute attack. Our x-ray findings indicated only one case of any significance that was not among the three who had been to the dispensary in the past two years. This man's lung picture indicated fibrosis of the right lung with marked calcification of the glands at the left lung root.

Melting Department

EXAMINATION of the dispensary records of the employees in the melting departments indicated that in the two years previous to our investigation, there were 10 employees treated at the dispensary for respiratory symptoms. Of these 10 cases, we have succeeded in obtaining x-ray pictures on seven of the individuals. In those seven pictures we found only two with any evidence of pathology. One individual had fibrosis of both lung fields. The dispensary records on this individual indicated that he had complained of dyspnea in March, 1946, while working at the Ajax furnace. In June, 1946, while at the Detroit furnace, and in June of the following year, he had repeated attacks of dyspnea. The last attack was diagnosed as industrial pneumonitis. One month after recovery, a 14 x 17 x-ray

film presented normal lung fields. One other man who had visited the dispensary with respiratory symptoms was diagnosed as having had bronchitis. Our x-ray findings on this individual indicated a mild fibrosis and nodulation at both lung bases. The remaining five x-ray films in this group were negative. Twelve other employees of the melting department had not been to the dispensary for the two years previous to our examination. From this group we obtained six x-ray films, one of which had some fine markings indicating a chronic pneumonitis—mild fibrosis at both bases of the lungs. The remaining five x-ray films in this group that had not visited the dispensary were normal. Out of the total in the melting department we found only three persons with any markings. This information is significant in that two of these three men were operators of the Ajax furnace where fluoride concentrations were found to range from two to nine milligrams per cubic meter of air. The average concentration was approximately five milligrams, which is twice the present maximum allowed concentration. One other case which developed after our x-ray screening of the employees at this plant is of interest. A Detroit furnace operator in early December, 1947, had a negative x-ray film. Twenty-one days later he had acute chemical pneumonitis, which upon x-ray taken at the Community General Hospital on a 14 x 17 film presented increased density over both lung fields. Three weeks later a similar type of x-ray examination presented negative lung findings.

Oxide Department

THE examination of records in the dispensary indicated that during the past two years there had been only one case from the oxide department wherein any symptom referred to the respiratory system. The complaints of this person were weak spells and shortness of breath. The plant physician, at the time, diagnosed the condition as a cardiac disease, and our x-ray of this individual indicated increased density over both lung bases with cardiac enlargement and obliterated cardiac angle. One other of our x-ray films from the oxide department deserves attention. This was of an ore mill operator, age 48 years, who had a negative dispensary record. His chest film presented generalized fibrosis with nodulation throughout both lung fields. Further investigation concerning the occupational history of this individual revealed to us that for 28 years previous to his employment at this plant he had been a foundry worker. In view of this occupational history, and because he was not exposed to high concentrations of beryllium or fluoride, I have diagnosed his case as one of silicosis. In the oxide department the dispensary records indicate the presence of occasional cases of dermatitis and conjunctivitis, which are most prevalent in the hot summer months. Aside from what has already been mentioned, the records for the oxide department are negative excepting for treatment of traumatic injuries.

In the history of this establishment there have been three fatalities. One of these has already been discussed. In the second case the employee worked as a helper in the arc furnace department. He was employed only one month, and postmortem examination revealed acute pneumonitis. The third case was a man employed as a watchman for five months, then as a janitor for 15 months. In this latter position he developed a dermatitis over the body. He had a cough, and complained of spitting blood. Unfortunately, more specific clinical and environmental information concerning him could not be obtained.

IN CONCLUSION, we have presented evidence of exposure to beryllium fluoride dusts in the extraction of beryllium oxide from beryl (a beryllium aluminum silicate) without any dispensary records for the past two years for respiratory illnesses with but one exception—wherein the man complained of shortness of breath, and further examination revealed he had cardiac disease. Our x-ray study detected this individual, and also one other man with evidence of pulmonary pathology. This was the man who had a 28-year history as a foundry worker, previous to his employment at the plant investigated. Others of our x-ray films on the people engaged in the manufacture of beryllium oxide were negative. In the pickling department the dispensary records indicated treatments for lung involvement in three persons during the two-year period. Exposures encountered in this department were to oxides of nitrogen which on the average were above the maximum allowed concentrations. Examinations by x-ray of all employees in this department were negative with but one exception, wherein we had evidence of a mild fibrosis in a man who had not had a dispensary record. Those who had dispensary records for lung involvement had negative findings in our films and in hospital x-ray films after recovering from acute attacks. In the melting department our x-ray findings indicated three cases with any evidence of lung markings. Two of these men worked at the Ajax furnace where they were exposed to fluoride concentrations averaging slightly more than twice the present maximum allowed concentration.

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Dermatological Hazards in the Leather Industry
—Wool-Pulling; Belting; Felt and Hair—

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IN A previous report,[1] the causative agents responsible for dermatitis and the types of eruptions prone to occur in the tanning of leather were reviewed. The purpose of this study is to complete our investigations of the skin hazards of the leather industry in Philadelphia by examining the wool-pulling, belting, and felt and hair industries. This survey necessitated supervised tours through the various plants; examinations of the workers at their jobs; interviewing the supervisors, workers, and medical personnel; the review of private office records (M.H.S.); and the review of statistical data supplied to us by the Department of Labor and Industry of the Commonwealth of Pennsylvania.*

Wool-Pulling

TWO large wool-pulling factories, employing some 400 workers, were inspected. Although a numerical breakdown was not available, negroes constituted the greater number of men employed in this industry. No women were employed in these establishments.

One plant used domestic sheep hides exclusively which were purchased from the leading American meat packing firms. Hides imported from New Zealand, Australia, Argentina, Chile, Uraguay, and South Africa constituted approximately 50% of the hides used by the other plant. Basically, with very few variations, the principles involved in wool-pulling were identical in both plants. The hides arrvied in large bails in one of two forms: (1) the "dry" type, (2) the "salted" type. All the imported hides with the exception of the South African products arrived in the dry state. Aside from the salting or drying process, these had been given no previous treatment.

The hides were subjected to two distinct processes: one involving the manufacturing of wool, the other, the preparation of the skin for the tanneries. The initial operation begins in the "wash-room" where the hides are soaked in large vats of water for 24 to 72 hours. This softens the hide and loosens the dirt and salt. All workers wore hip boots and rubber aprons, and some wore rubber gloves. Following the washing process the hides are transferred manually into "paddles" containing a solution of water and caustic soda. This procedure, requiring approximately 45 minutes, removes the heavy dirt and makes the hides more pliable. They are removed by hand and then placed in large centrifuges where they are dried. The partially dried hides, flesh side up, are then placed on a conveyor belt. As they are moved along, three men on each side of the belt paint the flesh side with a sodium sulfide solution. The hides are removed from the belt and hung on long racks.

This entire group of workers wore hip boots, rubber gauntlets, and rubber aprons to prevent contact with the wet hides. In addition, goggles were worn by the "painters" to prevent ocular burns from the splashing of the sodium sulfide solution.

The hides remain on the racks over night. "Curing," as this process is known, is merely the penetration of the sodium sulfide solution into the hair follicles thus making the hair very loose and facilitating pulling.

"Wool-pulling" follows. The hide is thrown over the "beam," a semicircular board placed at a 90° angle reaching to the waist. The wool is pulled with an outward motion, from above downward, and is sorted and graded in the same manuever. Some eight to 10 grades of wool are obtained. The ragged edges of the hides were skillfully trimmed with razor sharp knives. The process was a rapid one and all firm wool was removed with the knife. All wool-pullers wore aprons and gloves for protection against the action of sodium sulfide. A wool-puller can finish approximately 150 hides per day.

The wool is then placed in a large dryer where a temperature of 200° to 260° F is maintained. "Scouring" follows. The dry wool is washed in a solution of soap and soda ash. If bleached wool is desired, it is washed in a hydrogen peroxide solution. Following the washing process the wool is again placed in dryers, then bailed or placed in large burlap sacks.

After the completion of the wool-pulling process, the unhaired hides are subjected to another operation. They are placed in large revolving drums containing a solution of sodium sulfide

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This is the fifth of a series of papers reviewing in the dermatological field, the hazards encountered in the Commodity Goods Industries of the Philadelphia Industrial Center. These papers are incorporated as part of the lecture course in "Industrial Dermatitis" given to the post-graduate students in dermatology at the Graduate School of Medicine, University of Pennsylvania, Department of Dermatology, DR. DONALD M. PILLSBURY, Director.

*Courtesy of WILLIAM H. CHESTNUT, Secretary of the Department of Labor and Industry.

where they remain over night. The firm unpulled hair is loosened in this process. Washing follows. The hides are placed in paddles and milled about the water for several hours. All hair and the sodium sulfide solution are removed. The hides are then "bated," a process in which they are placed in baths containing an enzyme compound. This action makes them more permeable for tanning. After being neutralized the hides are "pickled" over night in a salt and sulfuric acid bath. The hides are removed, dried, graded and shipped to the tanners.

Medical facilities were not available in either plant. The incidence of the dermatitides was low for many of the processes are mechanical and protective clothing mandatory. Burns about the face and legs were reported among the painters handling the sodium sulfide solution. Occasionally, workers in the pickling department reported burns due to the sulfuric acid. Not a single case of anthrax had been reported in the industry since 1941.

Belting

THE largest belting manufacturing plant in the city of Philadelphia was examined. Although the plant was engaged principally in the manufacturing of belting, leather washers and leather packings were also made. Approximately 200 are employed in this industry in the Philadelphia Industrial Area, over one-half the total being employed in this plant. The numerical breakdown as to race and color was not available, but whites and males constituted by far the majority.

Leather used in belting was for the most part from cattle hides imported from Italy. Other sources were either South American or domestic hides. Only high grade and especially selected leather was used. Most of the hides were purchased tanned; if not so, they were tanned in the plant's own tannery.

The initial process consisted of "splitting" the hide by a mechanical device which measured the thickness desired. Some 25 different thicknesses were obtained. A "whiting" process, which is mechanical, smoothed the flesh side of the hide. Here the flesh side is held against high velocity revolving blades, the leather being drawn in an upward motion. One end of the leather strip is then "scarfed," also a mechanical process. "Sizing" follows: the scarfed ends are cemented together and then the flesh side is painted with a thin layer of the cement. The formula of the cement is a trade secret, being a product of the plant laboratory. The belt is sent to the "pressing" department. Cement is again painted on the flesh side. The flesh sides of two leather strips are then approximated and placed in large pneumatic presses. There were no instances of sensitivity to the cement. After a short interval the belt is removed and sent to the trimmers. The belts are trimmed to the desired widths and ready for shipment.

The manufacturing of leather washers and leather packings involved an entirely different process. The large hides were cut into discs. This is done by hand with razor-sharp knives. These discs of leather vary in size, ranging from three to nine inches in diameter. The superfluous leather is used in making small washers or sold as scrap leather. The discs are sent to the "felling" room, where they are impregnated with various waxes. From here they move to the moulding department. Cold and hot moulding methods are used. The disc is placed in a hot wax solution and then transferred to the pneumatic presses. Sometimes splash burns from the molten wax were observed in this department. Occasionally the moulds are placed in a hot chamber where a temperature of 290° F is maintained. Here they are baked for several hours. Miliaria was occasionally seen in this department. The packings or washers are then placed in lathes and trimmed by holding a sharp blade against the revolving packing or washers. Callosities were noted among the trimmers. The packings or washers were polished and prepared for shipment.

The plant maintained a well kept and adequate dispensary. A full-time nurse and a part-time physician were available. Although numerical breakdown of the dermatitides was not available, the incidence was very low. Splash burns due to the molten wax was the type of dermatitis most often encountered. Occasionally, workers in the moulding department reported miliaria when exposed to the heat of the hot chambers. Instances of sensitivity to leather proper, the cement or the waxes were not seen. Callosities, on the fingers of trimmers, were the stigmata of the trade.

Felt and Hair

THERE are approximately 200 employed in the felt and hair industry in Philadelphia. Of this number approximately 40% are negroes and 10% females. The plant surveyed is the largest of its kind in the Philadelphia Industrial Area.

Hair of goats and cattle is almost exclusively used in the manufacturing of the felt and hair of this industry. The main source of supply is the by-product of the leather tanneries. Occasionally reclaimed hair, a blend of many sources is used. Cattle hair is obtained already washed.

The process begins in the "wash room." The hair is placed in large box washers containing a strong alkaline soap solution. During the summer season all those employed in the wash room developed a folliculitis involving the forearms. This folliculitis is probably due to the contact of the dirty hair with the sweaty forearm. Large paddles in the washers continually mill the hair for approximately seven minutes. The hair is removed manually and "extracted": a mechanical procedure in which the hair passes through rollers, thus removing the excess water. Then by conveyor belt the hair is moved into steam dryers where a temperature of 220° is maintained. The hair gradually moves through the dryer and is collected. It is then pressed into bales weighing 400 to 500 pounds. It is sold as

such, stored, or immediately used in the manufacturing of felt.

Approximately six types of goat and cattle hair are used in the manufacturing of felt. The bales of hair are placed in a "pickering" machine which by its agitating and combing action blends the hair. A seed apron picks up and deposits the hair into a "willowing" machine. The willows break up the particles of hair which are then deposited on another apron. It is then placed in the "bur picker" which continues to comb the hair. By a blower system the hair is blown into the "garnet" machine where the separating and combing process is completed. It is then deposited into the "blamier" which turns the hair into "lap form." Two laps are formed, a button and top lap. The laps pass through a sizing compound composed of, (1) latex rubber, (2) tapioca flour, (3) gum, (4) dextrin, (5) 2% caustic soda, and (6) a dispersion. The bottom lap is then punched into a five-ounce layer of burlap by "needle looms." The felt is mechanically reversed and the top lap is punched into the burlap. This gives it an interlacing pattern. By conveyor belt the felt is placed on the steam tables of the "hardening" machine. The purpose of this operation is to moisten the felt. The felt proceeds through the hardening machine and the waffle indentations are pressed into the felt. Again by conveyors it passes through a steam-heated dryer. As it leaves the dryer an electrical knife trims the felt to a nine- or 12-foot width. A mechanical guillotine knife cuts the felt to 60-foot lengths. It is then wrapped, and ready for shipment.

Although the atmosphere is laden with dusts, no dermatitis due to these agents was observed. Aside from the cases of folliculitis reported from the "wash-room" no cases of dermatitis due to primary irritancy, allergy or biological agents were reported.

Incidence of Dermatitis in the Leather Industry

THE following is a breakdown of the incidence of dermatitis in the leather and its allied industries as compiled from the files of the Workmen's Insurance Fund made available to us through the cooperation of the Pennsylvania Department of Labor and Industry. This is a statistical analysis for the Commonwealth of Pennsylvania from 1941 to 1947 inclusive. However, it must be noted that this statistical survey does not include any cases of dermatitis occurring in those plants not covered by the Fund.

Unfortunately from the dermatological point of view the records were incomplete and inaccurate. The nomenclature in many instances was not standard, very vague and incorrect. Such vague terms as "rash," "skin infection," and "itch," were commonly used. A description of the lesions was lacking, and the site or sites of the lesions were often omitted. Diagnostic aids such as the patch test or bacteriological studies for anthrax were rarely done. In some instances, because of the vagueness or because of litigation, it was difficult to determine whether the dermatitis was of occupational origin.

Many of the patients, and rightly so, were treated by general practitioners. It was, however, apparent from these files that there was a lack of knowledge of the working environment, the possible hazards, the probable etiological factors, and a thorough understanding of industrial dermatology. This is a regrettable situation. Apparently the records are quite adequate from the legal standpoint, but of little value medically.

Year	Cases of Derm.	Leather and Allied Industries	Anthrax
1940	377	9	3
1941	417	25	12
1942	727	35	8
1943	1114	37	11
1944	944	12	1
1945	943	26	3
1946	684	28	5
1947	694	25	3
	5900	197	46

"Dermatitis"	70	Aniline	8
Leather poisoning	31	Chrome sores	3
Skin infections	12	Chemical burns	1
Skin irritations	2	Rash	16
Oil	4	Anthrax	46
Leather dust	1		
Dye poison	1	TOTAL	197

In this eight-year period, dermatitides encountered in the leather industry (tanning, wool-pulling, belting, hair and felt) represented approximately 3.4% of the cases of dermatitis reported from all industries in the Commonwealth of Pennsylvania. The rate of anthrax was 0.78% for all industries and 23.3% for the cases of dermatitis in the leather industry.

Summary

DESCRIPTIONS of the processes involved in the wool-pulling, belting, and hair and felt industries were reviewed.

2. Dermatological problems of these industries were reported.

3. A statistical analysis of the incidence and types of dermatitis was compiled.

Conclusion

THIS specialized study, restricted to the skin hazards of the leather and allied industries, was prepared for its practical application to the dermatologist. However, it can also be of inestimable value to: (1) the industrial physician and to the general practitioner, only if and when this study is integrated with other problems of industrial medicine and with the over-all health picture of the worker; (2) management and labor, who are also made aware of the skin hazards of these industries and the preventive measures that may be instituted; and (3) the insurance carriers, who should recognize and emphasize the importance of accurate and complete records for their own files and for medical statistics.

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Health at Work

—Abstracts of Proceedings of the 13th Annual Meeting of the Industrial Hygiene Foundation of America, Mellon Institute, Pittsburgh, November 17, 18 and 19, 1948—

Reported by

C. O. SAPPINGTON, M.D., DR. P.H.

IN ADDITION to an all-day session on November 18, 1948, the 13th annual meeting of the Industrial Hygiene Foundation of America featured concurrent round table conferences of medical, legal, engineering, chemical and ceramic subjects on November 17 and November 19. Attendance was limited to members of the Foundation.

The medical conference was as follows:

In the morning, there was a panel discussion on "Tuberculosis in Industry," DR. O. A. SANDER acting as moderator:

1. Mass Case Finding Surveys in Industry and the Role of the Plant Physician in Such Surveys—HERBERT R. EDWARDS, M.D., Executive Director, New York Tuberculosis and Health Association.

2. Tuberculosis among Industrial Workers from Viewpoint of the Sanatorium Physician—C. HOWARD MARCY, M.D., Medical Director, Tuberculosis League Hospital, Pittsburgh, and member, Foundation's Medical Committee.

3. The Placement of Workers in Industry, Particularly Ex-Patients and Those with Tuberculous Scars—S. D. STEINER, M.D., Medical Director, Oldsmobile Division, General Motors Corporation, Lansing, Michigan.

4. The Workingman's Chief Concern When He Develops Active Tuberculosis—LEO PRICE, M.D., Medical Director, Union Health Center, New York City.

5. The Compensation Aspects of Tuberculosis in Industrial Workers—HARRY NELSON, Director of Workmen's Compensation, Wisconsin Industrial Commission.

THE following were the luncheon speakers: DR. W. S. MCELLROY, Dean, School of Medicine, University of Pittsburgh, DR. WILLARD MACHLE, Consultant, New York, and member, Foundation's Medical Committee, and DR. THOMAS PARRAN, Dean, Graduate School of Public Health, University of Pittsburgh.

During the afternoon, the following subjects were discussed in an Open Forum:

(a) Physical examination of key employees.

(b) Reporting of health status to the employee from (1) a medicolegal-compensation point of view; (2) a strictly medical point of view; and (3) a humanitarian point of view.

(c) The use of psychologists and psychiatrists in the industrial health picture.

(d) The question of individual health evaluation with reference to promotion, placement and retirement.

(e) Periodic re-examination of industrial workers, including office workers. When should they be voluntary, when compulsory, and who decides, etc.

(f) Health education in industry.

(g) Retirement of industrial workers—the character of plans of member companies; the physician's role, physiologic aging, and disability retirement.

(h) Sickness absenteeism—how to get the facts and properly administer benefit plans with a reasonable control of impositions.

(i) Coordinating the industrial programs in preventive medicine with health programs of city, county and state agencies.

(j) Placement and employment of epileptics.

THE Legal Conference, with MR. T. C. WATERS as Chairman, had the following agenda:

1. Problems in the Administration of Workmen's Compensation Laws—MR. HARRY NELSON, Director, Workmen's Compensation, Wisconsin Industrial Commission, Madison, Wisconsin.

2. Procedure in the Formulation and Adoption of Codes of Industrial Hygiene—DR. LEONARD GREENBURG, Director, Division of Industrial Hygiene, New York Department of Labor, New York City, and MR. ANDREW KALMYKOW, Asst. Mgr. Casualty Dept., Association of Casualty and Surety Companies, New York City, and member, Foundation's Legal Committee.

3. Compensation for Partial Disability for the Pneumoconioses—DR. GEORGE WRIGHT, Trudeau Sanitorium, Trudeau, New York, and MR. THEODORE C. WATERS, Chairman of the Foundation's Legal Committee.

THE Engineering Conference, PROF. PHILIP DRINKER presiding, discussed the following topics:

1. Report on Foundation's Field Staff work, 1948.
2. The stack gas cleaning problem.
3. Winter air supply for industrial buildings.
4. Dust suppression by use of wetting agents.
5. Industrial heat exposures.

THE Chemical Conference was held on November 19, with H. F. SMYTH, JR., PH.D., Chairman, presiding, and discussed the following:

1. Sources, derivation and interpretation of toxicity information.
2. Proposed uniform industrial hygiene code.
3. The interest of industrial hygienists in safety.
4. Use of spiral attachment for impinger and precipitator in collecting air-borne particulate matter.

AND at the Ceramic Conference on November 19, MR. M. W. THOMPSON, General Manager Hall China Company, presided, and MR. W. G. HAZARD, Owens-Illinois Glass Company, acted as moderator, the following subjects being discussed:

1. Compensation for dust diseases.
2. Some medical aspects of dust diseases.
3. Permissible dustiness.
4. Radiant heat exposures.
5. Materials handling in relation to dust control.
6. Miscellaneous ceramic exposures.

Program Sessions

THE program sessions on November 18, 1948, at which MR. ANDREW FLETCHER, Board Chairman of the Industrial Hygiene Foundation, presided, had for their theme "Health at Work," with the following subjects and speakers:

How Big Is Our Job?—ANDREW FLETCHER, President, St. Joseph Lead Company, and Board Chairman, Industrial Hygiene Foundation.

Good Health Is Good Business (Keynote Address)—THOMAS PARRAN, M.D., Dean, Graduate School of Public Health, University of Pittsburgh.

Atomic Energy—Industrial Health Implications—JOHN Z. BOWERS, M.D., Chief of Section on Medicine, U. S. Atomic Energy Commission.

What the Foundation is Doing (Staff Report)—THEODORE F. HATCH, Research Director, Industrial Hygiene Foundation.

SUMMARIES of Medical and Engineering Conferences:

Medical—C. RICHARD WALMER, M.D., Secretary, Medical Committee, Industrial Hygiene Foundation.

Engineering—W. C. L. HEMEON, Secretary, Engineering Committee, Industrial Hygiene Foundation.

Industrial Hygiene Codes and Regulations—W. P. YANT, SC.D., Director of Research and Development, Mine Safety Appliances Company.

Occupational Humanics was the subject of the first part of the afternoon program, with H. B. MAYNARD, President, Methods Engineering Council, presiding, with following subjects and speakers:

The Man and the Job—LILLIAN M. GILBRETH, SC.D., President, Gilbreth, Inc.

Proper Job Placement—M. M. SHAFER, M.D., Medical Director, Frigidaire Division, General Motors.

The Older Worker—Industry's Great Problem of the Future—T. G. KLUMPP, M.D., President, Winthrop-Stearns, Inc.

MR. V. P. AHEARN, Executive Secretary, National Industrial Sand Association, and Executive Director, President's Conference on Industrial Safety, presided at the session in the latter part of the afternoon on November 18, the main topic being Prime Factors in Industrial Relations, with the following subjects and speakers:

Industrial Health Legislation in 1948—MR. THEODORE C. WATERS, Mullikin, Stockbridge & Waters, Baltimore.

Observations on Current Trends in Social Insurance Legislation—MR. HARRY G. WALTNER, JR., Standard Oil Company (N.J.)

Summation by V. P. AHEARN and JOHN F. MCMAHON.

How Big Is Our Job?

IN OPENING the meeting, MR. ANDREW FLETCHER said in part, 'The job we have today is a never ending one. Perfection in industrial health is a goal that we shall probably never reach, but the progress we have made over the last 50 years, or, going back further, ever since the industrial revolution, is amazing. Industrial health is more important today than it has ever been, owing to the enormous impact of our rearmament program, industrial mobilization, and requirements of the Marshall Plan on our economy, plus the growing interest of employer and employee in better working conditions.

'The latest report from the Census Bureau indicates that 61,245,000 Americans are gainfully employed in the United States, and it is anticipated that by mid-1949 employment will reach 62,000,000. At the same time, the 1947 census of manufacturers shows that manufacturing plants have increased from 185,000 units in 1939 to 250,000 in 1947.

'The significance of this development is, of course, the manpower pinch which is being felt in most sections of the country. In my own line, which is lead and zinc mining, we have been acutely aware of this shortage of manpower ever since the end of World War II. It is one of the reasons why an adequate supply of non-ferrous metals has not been forthcoming from our greatest resources.

'The problem of efficiently utilizing our available manpower is complicated by the fact that about 9½ million young men between the ages of 18 and 26, most of them employed, will register under the new draft law, and, as many of them will be called for two years of service, their absence from the available employment pool will be keenly felt, while business maintains its high rate of production.

'All of this leads up to an observation which I know you must share, namely, that the importance of preserving our industrial health to the utmost, sound as this is at any time, becomes even more compelling today.

'Industrial hygiene touches the field of human relations. Such questions as the nature of the employment offered and the working conditions, and the security of the job, have been increasingly emphasized in the last 16 years, during which social gains have received so much attention. In one survey made in industry, it was estimated that 85% of the medical load in some large firms comes from only about 30% of the plant personnel, and some companies discovered that about 60% of their absenteeism comes from about 20% of the working group. Here is a good opportunity for more attention to the human factor in keeping personnel at top efficiency.

'Our staff here estimates industry spends about 75 million dollars a year on industrial health. The Federal government is spending about five million dollars, and, of course, nearly every state in the Union spends a certain amount of tax receipts in the same field. By contrast, the Federal Security Agency claims that ill health costs the United States 8½ billion man hours of work each year. The FSA further alleges that sickness and disabilities cost 27 billion dollars a year in national wealth. This is a staggeringly impressive figure, and to reduce it is one of the goals toward which we should work. Needless to say, much of this loss could be prevented by a more aggressive or positive program of industrial health and safety.

'The choice is ours as to whether private industry or government, or both, shall take the initiative in helping cure this unsatisfactory situation. My own feeling has been that the initiative should come from industry, but that government aid is necessary under our free competitive system. Even though our system of free enterprise has been so productive of beneficial results for humanity in the enormous outpouring of wealth it is able to provide, we may sometimes overlook its shortcomings.

'For example, the stress of keen competition under which our system operates naturally tends to cause some producers to skimp on expenditures having to do with the health and welfare of employees, even though it can be demonstrated that the expenditures pay dividends in dollars and cents. That is why the efforts of Federal and state governments in establishing minimum standards for industrial health and safety are necessary. It is most encouraging to me that in this meeting, and in the work of the Foundation, we have the cooperation of both industry and government in making further progress in the industrial health field.'

Foundation Activities

MR. JOHN F. MCMAHON reported on the activities of the Foundation and industrial health activities in general, as follows.

'The membership of the Industrial Hygiene Foundation now numbers 353 companies and associations, plus 105 special subscribers.

'Early this year (1948) the Foundation announced the establishment of a new laboratory for industrial toxicology and physiology. This step was taken in response to demands from member companies. The new laboratory marks a highly important advance in the development of this research association of industries—a development that strengthens the Foundation and promises important benefits not only to the members and their employees, but ultimately to all members of America's industrial society.

'Two projects, both of one-year duration, have already been initiated and several short-time investigations have been completed. Plant studies and field researches conducted by the Foundation's staff this year have exceeded, both in scope and importance, anything previously undertaken. The work has included a trip by two men to South America and a number of trips to Canada.

'Our most valuable publication of the year is "Industrial Health Department Functions and Relationships," giving the results of the two-year field study by DR. C. O. SAPPINGTON that covered 278 plants in 33 states. This publication provides management with a starting point in planning new health departments or changes in present medical facilities for workers. "Safety in Sandblasting" was prepared for the National Industrial Sand Association by MR. HEMEON, of the Foundation's staff.

'This year a new conference has been added, a Ceramic Conference which will be held for representatives of Foundation members in the glass, pottery, refractories and abrasive industries. This Ceramic Conference was arranged at the direct request of members in these industries, and M. W. THOMPSON, Treasurer and General Manager of Hall China Company, is Conference Chairman. The Foundation welcomes this development. If there are other industries or other groups of members interested in such round-table sessions, we will be glad to have them gather here and to assist with the arrangements. Such conferences need not be held annually; nor need they be held at annual meeting time.

'With physicians, engineers, chemists, and attorneys from member companies meeting in group discussions on phases of industrial health as they relate to their specialties, and with representatives of management, as well as professional people, assembled in the main meeting, we realize that more and more departments within an individual company have their parts to play in the advancement of industrial health. The role of the purchasing department was brought out at one of our past meetings. Public relations and advertising also have their jobs to do in "telling the story" and promoting employee health education. The breadth of subject matter covered at the various conferences, in addition to the program of this main meeting, is sharply indicative of, "How Big is Our Job?"

'How Big is Our Job? Industrial health is in part a sentinel standing guard at the outposts of knowledge to alert industry of new risks which may accompany technologic advances.

'But serving as sentinel is only part of the job. What about the older worker, the individual who must work or must be kept? What about the carnage from heart disease which now claims over half a million lives a year, and the implications of this loss for industry when personalized to a top salesmanager or an "irreplaceable" craftsman?

'What about the right man on the right job? One authority on personnel claims that almost half of the working people are "square pegs in round holes," and that "the average worker, in dollars and cents, loses about $15,000 in his productive years, the income he might have received if he had employed his full capabilities in the right job." This despite the fact that Plato was writing about proper job placement some 2,400 years ago!

'Human relationships in industry have been likened to a triangle: (1) the worker; (2) his job or work station; and (3) his working environment. Industrial health is concerned with all three. That triangle is another indicator of the size of our job.'

Good Health Is Good Business

IN GIVING the keynote address, DR. THOMAS PARRAN noted that increasingly we are becoming an urbanized and industrialized nation. Existing schools of public health, with few exceptions, have not given major attention to the complex problems resulting from this trend. In the Pittsburgh area, with its great concentration of industry, there is fortunately also a concentration of persons concerned with industrial health and with great competence in its several phases. The Industrial Hygiene Foundation is the outstanding example.

'Like every phase of modern industry, public health, with its important sector of industrial health, needs to utilize many scientific disciplines. In industrial health, for example, there is required not only the doctor and nurse, but the physiologist, the psychologist, the engineer, the chemist, the toxicologist, as well as representatives of many other disciplines—in short, a fusion of the sciences. Their contributions are diffused unless brought to bear as a unit upon the health of the industrial worker.

'Nor can industrial health problems be considered separate and apart from those of a community generally. The science and practice of public health, as it has developed in this country, represents a complex mosaic in which governments—Federal, state and local—voluntary associations of citizens, educational institutions, industry, labor and the public generally, each has an important role to play. The School of Public Health which we shall establish here should be a center for leadership in this total problem of advancing physical and mental health.

'The record shows, however, that while American business puts to work promptly the best that is known in the mechanical and engineering sciences, it has not applied so fully the fund of knowledge accumulated in the health sciences. There is a vast body of knowledge concerning disease prevention and health promotion which, so far, has not been put to work. An unpublished study, "Good Health is Good Business," by the National Planning Association, sound as it is, is little more than a preface to the problem. It points the way, but it asks the right questions. It indicates the kind of evidence that will be convincing. Take these three items, for example:

'The 1943 survey of absenteeism in eight West-Coast aircraft plants, which showed that almost three-fourths of all the absenteeism was due to illness of workers or of their families.

'The several 1943 studies which showed that on an

Dr. Thomas Parran, Keynote Speaker, and Admiral Ben Moreell, President, Jones & Laughlin Steel Corporation

average day 1,000,000 persons in gainful jobs were absent because of disability. Assuming the 1943 manufacturing wage of $7.69, that meant an average daily wage loss to employees of $7,690,000 in 1943.

'And these figures take in only the employed persons. It is estimated that an additional 2.8 million potential workers, or approximately 5% of the effective labor force, were unable to pursue gainful work because of disability on an average day.

'Production lost through illness and disability is gone forever. And the financial burden of care will come back to industry in the form of voluntary contributions and taxes. The only sound, economic answer must be to meet this problem squarely through a program of prevention and through the kind of care which keeps illness at a minimum.

'The next task is to get the profits and the costs on the same balance sheet, for we can not make progress until the industrial health operation is so visible as to be convincing to the most hard-boiled corporate director.

'The first justification for these programs is economic. Not only men and women and children, but dollars, are at stake. A comprehensive industrial health program would strike at absenteeism, since "90% of the 842 firms replying to the National Association of Manufacturers reported some reduction in labor turnover after the introduction of industrial health practices." Similar reports were made in the other surveys.

'This is a problem upon which all citizens of the industrial community may unite. Just as there is in government no Republican, no Democratic, but only a professional, way to run a health department, so there should be in industry no real conflict of interest between labor and management on the matter of health.

'All too often, when management inaugurates a broad program of health and welfare, left-wing labor leaders attack it as a paternalistic effort to woo the loyalties of the workers. All too often, when unions initiate welfare, health or medical care programs, management decries it as a nefarious effort on the part of labor leaders to strengthen their hold upon the workers. All too often when government programs are proposed, the opponents see them as a political conspiracy to get votes.

'We might well look at the common denominator, for possibly all three are right. The loyalties of men and women are won by those who meet real problems. Loyalties are lost by failing to meet problems or by denying their existence.

'There is a wide gap between what we know and what we do. What are the reasons for this unevenness of progress, if it is so manifestly self-evident that good health is good business? A profound student of business problems recently has told me that everyone accepts the proposition in the abstract; the obstacles are the specifics. How does the poorly run small-to-medium sized plant start a good health program? It operates on a feast or famine basis. What will convince the tough board that it should add to current costs and be sure the expenditure represents a real investment? What dividends can you promise this year? If this company needs new machinery it can borrow money from the bank. Can it do so for this capital expenditure? The first point to prove, he suggests, is increased production of the individual in the plant. There are some obvious lacks in our evidence, some obvious reasons for our difficulty in convincing even the banker.

'We all know that among some medical staffs there is lack of competence, lack of comprehension of the job to be done, and, consequently, poor service. Among some managements there is a marked incapacity to see the woods rather than the tree. Among some groups of workers there is a lack of education as to the value of health services. And in all too many plants one sees mutual distrust between management and labor which bars constructive health programs, as well as other mutually profitable efforts. In many industries the task of an industrial health service has been too narrowly conceived. As a result of all these things, some services miss the opportunity for preventive action and creative industrial hygiene, and are used only for patching up injuries.

'In modern industry a prime objective is the maximum productivity of workers. To attain this, something more than skill and physical fitness is needed. A worker can be skilled and physically fit and even contented, yet not contribute his best. To contribute one's best in any effort requires a sense of participation, of being needed, of belonging, of faith and confidence in the endeavor, of esteem of fellow workers—in short, morale.

'No one believes that an industrial health service per se, can accomplish this total objective, but a health service can contribute greatly if it is broadly conceived and competently staffed with a group of persons possessing knowledge and the capacity to apply the several sciences which advance total physical and mental health.

'It will be a major interest of our new School of Public Health, working in conjunction with the Industrial Hygiene Foundation and with your cooperation, all working together as a part of the same team, to explore this whole field of study and training—its practical possibilities as well as its limitations. We hope the new knowledge we gain and the personnel we train will be of real value to you. And we hope that at every stage of our development we may have your counsel, your participation, your active personal help. We want to make this the kind of center that has been needed.

'The whole theme of the sessions here suggests that beyond today's practice in industrial health there are further areas in which we can use with profit the sciences comprising physical and mental health to promote efficiency, improve morale, and increase profits.'

Atomic Energy

DR. JOHN Z. BOWERS spoke on the subject "Atomic Energy—Industrial Health Implications."

'There are two aspects of the activities in the field of atomic energy which will be of interest to you. The first is the expanding broad field of industrial hygiene as it is encountered in the Atomic Energy Commission and its allied facilities; the second is the implication that lies in the use of radioactive isotopes as research tools.

'The manufacture of atomic weapons entails the handling of large amounts of material which emits radiations that are potentially damaging to the living organism. It is to be hoped that the coming years will see the successful harnessing of atomic energy to serve as a source of power. The General Electric Company is undertaking an extensive program in this direction. The success of such a program will have an even greater impact on the field of industrial hygiene than is presently felt from the developments in the field of atomic energy. It is obvious that in the years to come we will all be faced with the necessity for knowledge regarding the medical problems inherent in this program.

'The radiations encountered in the atomic energy field are in no sense different from the forms of radiation which biophysicists and other scientists had been studying for some time before the days of the Manhattan District. The essential change lies in the amounts of the various forms of radiation encountered; there is no new or mysterious radiation. Also, the various forms of radiation which are encountered do not differ in a qualitative sense in their effects on the human body; rather the difference lies in the quantity of the effect they produce.

'The liberation of atomic energy implies a splitting of the nucleus of the atom and when this nucleus is split, a variety of radiations may be liberated.

'Alpha particles may be set free—these particles are highly damaging but fortunately are practically non-penetrating to the unbroken skin. Beta particles may be liberated—these particles are superficially penetrating and moderately damaging. Because of this superficial penetration their main effects are felt on the skin where they may cause profound changes. Gamma rays are quite similar to x-rays: they are relatively the least damaging of the three but are highly penetrating. Finally, neutrons which are uncharged particles are highly penetrating and are able to induce the liberation of a variety of radiations from the elements contained in the medium through which they pass.

'All of these radiations affect certain tissues within the body. There is considerable variation in tissue sensitivity, and there is also considerable variation in individual sensitivity. Tissue sensitivity is an important characteristic, and it is to those tissues most sensitive that we turn for evidence of over-exposure to radiation. Just as with certain organic solvents we detect beginning changes by subclinical icterus or in silicosis by repeated chest x-rays, so in the field of atomic energy we place our greatest reliance for evidence of over-exposure on changes in the white blood count and especially the lymphoid elements. Frequent peripheral blood counts and differentials are essential for the worker in this field. However, as in other industries in which there may be a hazard, we do not desire to restrict our activities to the detection of changes which have already occurred. Comparable to dust analyses to detect potentially dangerous concentrations are the radiation detection procedures which are in constant vigilance in the environment of the worker. A variety of instruments are in use—some worn by the worker, others for detection at a greater distance. Perhaps the most simple is the piece of film which the worker wears in a badge and which is developed at frequent intervals to compare with film which has been exposed to known amounts of radiation. In proximity are the instruments which are used for more accurate measurements—these are usually compact and easily interpreted.

'Finally, we have the interposition of shielding and distance between the worker and the radioactive material—lead and concrete barriers, an integral part of many units, of adequate depth and height to absorb sufficient amounts of radiation to bring the exposure within the permissible range. Remote control devices have been developed, as well as other mechanical devices for safe handling of the materials.

'The successful accomplishment of such a program requires the services and direction of individuals who have a background in radiation physics and are familiar with the effects that such radiations may have on the body. This is an interesting and expanding field and, recognizing its importance, the Atomic Energy Commission is supporting, through the National Research Council, technical fellowships in which college graduates who have majored in science or engineering receive one year of intensive training in the necessary physics, electronics and biology.

'As of this date 18 such fellows are in training at the University of Rochester Atomic Energy Project and at the Oak Ridge National Laboratory. There are evidences of increasing interest in this program, and it is our intention that these men will not be bound to positions with the AEC, but are free to enter into industrial appointments and other fields of endeavor.

'An isotope is a form of an element which has all of the chemical properties of the element but which may be differentiated by minor variations in weight. By bombarding these forms of the element with charged or uncharged particles it is possible to cause them to emit detectable radiations over a varying period of time; radiations which may be detected with suitable equipment. Now, since each time a radiation is detected it represents the disintegration of an atom of the element it is easy to see that by utilizing the radioactive isotopes we are not only able to detect the presence or absence of a particular element but are also able to detect it at a low concentration.

'Thus because we are able to detect such small amounts of these materials we are able to utilize them without giving enough to cause damage from the radiations they emit.

'Radioactive isotopes had actually been in use for some time before the successful development of an atomic energy project. However, with the chain-reacting uranium pile as a source of radiation, it is now possible to prepare some of these materials even at a kilogram level whereas previously they had been prepared at the microgram level. The greatest application of these radioactive isotopes lies in their use as research tools, and you may be interested to hear about such experiments, as an example of the type of work that may be done with them.

'We have been interested to learn of the deposition of beryllium in the body beyond its pulmonary concentrations. The radioactive isotope, beryllium 7, is distributed in the body in exactly the same way as the non-radioactive isotope—therefore, by the use of the radioactive material we are able to follow the distribution of minute amounts of the element in the bones, liver and other organs and tissues.

'The agricultural field has found a unique tool for plant and soil research with radioactive isotopes. For instance, the radioactive isotopes of phosphorus have been used extensively to study phosphate movement and uptake in soils. Whereas, five years ago it required an outstanding analytical chemist working four days to detect one millionth gram of radioactive phosphorus, it is now possible to detect one millionth of a millionth of a gram in about five hours—the same chemist with a Geiger Müller counter. Assuming that the plants that are growing in the radioactive soil do take up radioactive phosphorus, we can now determine in what part of the plant the radioactive phosphorus is deposited. By dividing the plant into its component parts each may be assayed separately for material in very precise amounts.

'It is unique that the chain-reacting uranium piles which were originally designed to prepare the elements that are components of an atomic bomb produce as a by-product these radioactive isotopes which are said to be the greatest contribution to the biological research field since the introduction of the microscope. Radio-isotopes are available for many of the elements in a form which makes them usable in research projects. For these purposes it is important that the isotope in question should have a radioactivity of sufficient duration to persist through the experiment, that its radiations should not be damaging in the amounts used, and that the element itself is non-toxic in the amount employed.

'It is unfortunate that atomic energy was introduced into our lives as a weapon of war, in that it is difficult to recognize the extensive applications which it holds in contributing to the welfare of mankind. Because of its great potential as a weapon of war there has been, of necessity, a great amount of secrecy attendant upon the activities in this field as it refers to the manufacture of weapons in the broadest sense. However, it is necessary for all of us to realize that here is a force which is penetrating the framework of society at every angle. The impact upon the power problem with the realization that chain-reacting piles may be used as a source of power lies in the future, but the use of radioactive isotopes is already a part of many of the medical schools of this country. An increasing number of articles are appearing in the scientific literature in this field, and there is hardly a medical meeting of any proportion in which this problem is not discussed. At the Oak Ridge National Laboratory we are sponsoring courses on the labcratory procedures necessary for the use of radioactive isotopes. These courses are of one month's duration and any who are interested in such training for themselves or members of their staff should contact the Oak Ridge Institute of Nuclear Studies for information on them.

'Finally it should be emphasized that in atomic energy lies a unique challenge to the physicians and their compatriots. This is a subject with which we must immediately become acquainted, for our responsibilities are rapidly increasing.'

What the Foundation Is Doing

THEODORE F. HATCH presented a report on the activities of the Foundation.

The steady growth of technical services to member companies has been reviewed in previous reports. In this respect, the past year is no exception. No attempt is made, therefore, to list all of the projects of the year and only those which highlight the work will be described.

The direct plant studies, which constitute the major activity of the staff, have provided, as in the past, a variety of experiences and contact with a representative cross-section of problems in industrial hygiene. Projects ranged from brief studies of specific hazardous exposures to undertakings of some magnitude, involving questions of administrative practices and policy and coordination of health services. One major undertaking required some 20,000 miles of travel to cover an adequate representation of operations. Another had to do with the design of a new plant into which maximum health protection is to be built. As a primary defense measure, new processes and new types of equipment have been developed or adapted by the company to their particular operations so as to minimize in every way the generation or release of the contaminating agent. This represents the most fundamental approach in the control of occupational hazards.

One field project is of particular interest because of its basic research aspects. Under the sponsorship of a group of member companies, the nature and magnitude of heat exposures in the glass industry has been studied, with particular reference to radiant heat. The findings show that intense radiation rather than high air temperature is the major problem and, as a consequence, that present control by ventilation is of limited value. The greater effectiveness of radiation screening, as the primary control measure, was demonstrated in the course of the study, giving promise of considerable further improvement of working conditions in this industry.

In accordance with the authorization of the Trustees a year ago, laboratory facilities have been secured and a small staff assembled for research and laboratory investigation in toxicology and other problems. Two types of investigations are contemplated: (1) basic studies having wide application to industrial problems, and (2) specific investigations arising out of immediate problems of member companies, as, for example, toxicological studies on new chemicals. A project in the first category which is now in progress is concerned with the role of particle size in determining the hazards of dusts and fumes.

The shift in emphasis from curative to preventive medicine, which characterizes modern industrial health services, has required changes in the organization and practices of the medical department. These changes are still taking place, and ideas have not yet crystallized. Programs differ widely as, for example, in the extent of participation of the health department in job analysis and placement of workers and other human problems not directly concerned with specific disease prevention. There is need for constant review of practices and accomplishments to hasten the day when the scope of work and responsibilities of the health department and its relation to other departments will be more clearly defined. DR. SAPPINGTON'S study for the Foundation, on which he had previously reported, represents one

important step in this direction. During the past year there have been additional opportunities to make further studies of health department administration at the request of member companies. This is a real advance in Foundation activities and services.

The human problems of industry are of increasing interest and concern. Many of these problems come from poor adjustment of the worker to his job, and from improper design of his tools or of the industrial environment. They involve questions of physiology and psychology, just as the occupational disease problems involve medicine and toxicology. The opportunities for assistance to industry by physiologists, psychologists and other specialties in these broad human problems was considered during a conference this year, sponsored jointly by the Foundation and the Department of Industrial Hygiene, University of Pittsburgh Medical School. Active discussion by more than 50 physicians, physiologists, psychologists, industrial relations managers and engineers attested to the great interest within industry and among the specialists. There is real need to broaden the scope of industrial hygiene in this direction, as the conference so clearly demonstrated.

Because of the constant and growing concern by industry with the problem of safe and acceptable disposal of gaseous and particulate wastes into the outside atmosphere, this subject deserves special mention. The Foundation has been even more actively involved in the problem this year than in the past. The experience indicates the need for more systematic studies, to provide more factual data as a basis for determining action in place of the rather limited and largely empirical consideration that is commonly given to the problem at present.

The Foundation staff continues active participation in the affairs of professional societies, committees, etc. At present, the organization has representation on 12 national committees concerned with industrial health problems. Sponsoring agencies include the National Research Council, American Standards Association, U. S. Public Health Service, and professional societies such as the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS.

A creditable number of technical papers have been presented at professional meetings, conferences and university seminars. Staff members have attended several meetings of industrial associations to discuss their particular health problem, the control measures employed in the industry and the needs for further investigation and for improvement of working conditions. Such opportunities for joint discussion and exchanges of experience are of great practical value, and are highly regarded as an activity of the Foundation staff.

Industrial Hygiene Codes and Regulations

WILLIAM P. YANT presented the subject "Industrial Hygiene Codes and Regulations."

The usefulness of industrial hygiene codes is inherent in their compilation of good knowledge and description of good practices, their contribution to education and understanding, the basis they provide for measuring and comparing the results of endeavor, and their effect whether voluntary or legal in attaining good practice. A consideration of these codes is no longer one of their usefulness and desirability, but is that of the development and adoption of codes that are adequate, reliable, and practical for aiding industry in achieving safe and healthful working conditions. Essentially all of the states and territories of the United States and several of the cities have industrial hygiene facilities with authority to promulgate industrial hygiene codes and the power to administer them.

Most of the states have industrial hygiene codes of one form or another. Owing to the privileges of the individual states to develop codes along patterns of their own choosing, the various state codes vary widely in concept and content. This creates a confusing and undesirable situation which impedes the progress of industrial hygiene activity. In an endeavor to alleviate this situation, the AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS has been engaged in the development of a model code with a view to its adoption by the states, thereby to provide uniformity of requirements. The first draft of this code was completed several months ago and submitted for comment and criticism to persons in a representative cross-section of interest—industry, labor, insurance, and others. The comments have been carefully considered and a revision of the code has recently been completed.

The creation and general adoption of an acceptable, uniform code by the states should be looked upon with much favor by all concerned. There are, however, many difficulties to be met and obstacles to be overcome. The potential gains justify the endeavor.

"The Man and the Job"

THE afternoon session had the subject of "Occupational Humanics" for the first half of the session, and DR. LILLIAN M. GILBRETH presented the first topic, "The Man and the Job."

'We need not trace through the years the increasing emphasis on mechanization. We know the later stages all too well. Even as the progressive and humanitarian leaders in industry tried to reduce the hazards and make the human element of the man-machine more healthy on the job rather than less, they were criticized for "technocracy," 'mechanization" and putting more stress on the exact than on the human sciences—the social sciences. They were blamed for the so-called "cultural lag," without definition of the term, accurate measurement of the "lag," and well thought-through advice as to what they could do about it.

'Even today there is wide difference of opinion as to what the problem is. Do the man and the job present different problems, and, if they do, are the problems irreconcilable? Does the job require the man to do more and more of less and less interesting work? Are the "operating" and the "personnel' departments, in factory and office going at their work from different viewpoints—the production people trying to find the man who can turn out most work, with little thought as to what the work does to him, and the personnel people trying to find the best job for the man, whether he is the best man for the job or not?

'Those who fear mechanization are apt to think of the man who runs the machine as becoming a robot, a slave to the machine, tyrannized by time, by pace, by schedule, by rhythm, by standardization. They may even think of work as regimentation in every possible way, and of "leisure" after such work as regimented also by a group who fail to see that

real leisure is free from restraint and implies choice of the way in which it is to be spent.

'The attitude of the worker who is running a machine differs, of course, as he differs from others. If he dislikes machines, if he dislikes his job, if he is physically or emotionally ill or exhausted, he may hate the machine. But if he likes to work, understands the machine, wants to increase production, he may get to have for his machine the same feeling that the old skilled craftsman had for his tools. It may become an extension of his personality. Like the materials with which he works, it helps him to create. Fly with a young aviator in his own plane, drive with a young speed addict in his new car, talk with your daughter about her sewing machine or her dishwasher. It is not the machine that we have to fear, but our slowness to realize that it can release, not enslave—can be a partner and not a tyrant.

'There is of course the question of who owns the machine. If it is mine I may feel differently toward it than if it belongs to someone else. Especially if I happen to be overly possessive, or envious, or hate the person to whom it does belong, or the economic system which made it possible for him to own it while I cannot. Or I may dislike the machine's environment or transfer to it any number of "hates" that possess me.

'Another difficulty with the man and the job is that we have not always designed the machine so that it is as easy and comfortable to operate as it should be, or the equipment so that it can be grouped around him at his workplace in a way that will most effectively utilize his time and energy. Time after time, as we make motion studies in shop or office, we wish that we could cut off corners of equipment, so that we could develop a circular work space. We long to move the devices that start and stop the machine to places within normal and easy reach of the operator. We wish that designers and makers of machines and equipment could stand with us and see the frustration of the worker and the industrial engineer as they try together to make things simpler, easier and more effective. We need work simplification, data on physical and emotional demands of the job, pooling of information.

'The "cultural lag" that menaces mechanization —if by this we mean our development of the social sciences to match our development of the exact sciences and our realization of the great need for social betterment—undoubtedly exists. But does this imply slowing up on technical development, or speeding up on social development? Delay in research we are facing now, and coming to realize the dangers that it involves.

'But is it necessary to see that technical development is stopped? Of course not. The answer to the problem is that the man and the job must be studied together. This not only must be done; it is being done. The means for making such studies exist. More and more techniques and scientific methods are available for the study of the "human element." We in the area of scientific management, and in the group who specialize in motion and time study, have realized for years that the-man-and-the-job is the subject of our work. Job descriptions, job analyses, job evaluation, merit rating all prove this. We have worked under great difficulties because of unavailability of data on the man-at-work. We have asked continuously for directives on physical demands of work. We may not have welcomed enthusiastically the psychologists, psychiatrists, and other representatives of the group who study the man, as they have come into industry. But perhaps that was not all our fault. We realize that we have much to gain, and we ask for material that is sound, easily understood and concrete.

'We know our needs and can put them into questions. For example: "What is fatigue?" How can we best recognize skills and supply satisfactions?" "How can we teach people to do their jobs so that they will be better and not worse for doing them?" We need texts on the physiological requirements of the man to go with our texts on the demands of the job. We expect leadership from this Industrial Hygiene Foundation and help from all who participate in its discussions or read its proceedings.

'Interest in all phases of the subject we are discussing is growing. Sometimes a meeting will discuss fatigue all evening and end with the definition "Fatigue is a negative attitude toward work.' It may not seem like a very helpful finding, but the listening and discussing group has gained a knowledge of new material and had experience in considering it together.

'Just as the-man-and-the-job is a key problem in all institutions, industry, business, agriculture, the home—so cooperation of all groups having contributions to make, pooling resources and adequate leadership, furnish the key to the solution. And the future looks hopeful.'

Proper Job Placement

DR. M. M. SHAFER presented the subject "Proper Job Placement."

'A job analysis showing definitely the physical work requirements of a particular job and the fitting of men to jobs in accordance with these requirements, is an important phase of industrial medicine. With the limited manpower during the recent war, the need for such specific selection was especially emphasized. It was evident, too, with the shortage of trained industrial medical personnel, that, to be practical, the program had to be highly organized and means be provided to carry it on without close supervision of the medical department.

'We are concerned with the procedure, interdepartmental relations and special mechanics that were developed to insure a practical and effective program, including provision for rapid shifting of employees from one job to another to adjust for absenteeism. A series of classification forms was described, and illustrated. These have proved of great practical value. The manner in which these cards are prepared and used was outlined in some detail. (Note: Copies of the three record forms used in this report may be obtained by writing to DR. M. M. SHAFER, Medical Director, Frigidaire Division, General Motors, Dayton, Ohio.)

'The success of the program during the war resulted in its continued use in present peace-time production with the same practical value. It provides a basis for selection and placement of individuals on more than 1200 current jobs with their manifold requirements.'

The Older Worker

DR. T. G. KLUMPP closed this portion of the program presenting a paper entitled "The Older Worker —Industry's Great Problem of the Future."

'In the past our chief endeavor was to learn to run the gauntlet of infections so that we might be

Dr. M. M. Shafer, Medical Director, Frigidaire Division, General Motors

Dr. Theodore G. Klumpp, President, Winthrop-Stearns, Inc.

able to raise a reasonable number of our children to adult life. But as a result of our success in conquering infections and some of the most deadly diseases of childhood, we now have an adult population that is larger in proportion than it has ever been before. It promises to grow even greater as the years roll by. This poses new problems for industry as well as for society at large, and hitherto neglected diseases assume compelling importance. Neither medicine nor industry, nor the state, has any carefully thought out program of what to do with the vast population of older persons that is rising in our midst. Only Dr. Townsend has a $50.00 every Friday plan which most doctors feel is not the answer.

'The diseases of the heart and blood vessels kill at least three times as many as cancer, six times as many as accidents, eight times as many as pneumonia, 11 times as many as tuberculosis, and at least 500 times as many as infantile paralysis. That is not to say that these conditions are not serious, but I want you to have no doubt as to what is public enemy number one.

'According to U. S. Census figures, and reliable estimates with respect to the future, the proportion of our population 45 years of age and over appears as follows. These figures do not take into account the possibility of future dramatic medical discoveries that might further change the longevity picture:

1860 — 13.1%	1920 — 20.8%
1880 — 16.0%	1940 — 26.5%
1900 — 17.8%	1960 — 33.3%

1980 — 40.3%

'When we consider those 65 years and over, the following percentage distribution is reflected:

1860 — 2.7%	1920 — 4.7%
1880 — 3.4%	1940 — 6.8%
1900 — 4.1%	1960 — 10.0%

1980 — 14.4%

'The important facts to be derived from these data are that the weight of our population is shifting toward the older group, and by 1980 two-fifths of our population will be over 45 and one-seventh over 65. At the same time the total number of our people is also increasing. It has been conservatively estimated that we will have not less than 150 million people by 1980 and probably as many as 164 million. This means that by that time there will be not less than 60 million 45 years and over, and more than 21 million, 65 and over. These figures are in fairly close agreement with the "Forecasts of the Population of the United States" recently released by the Department of Commerce. Think of it: 21 million persons 65 and over. These figures have special significance in the light of the present all-time record of over 60 million gainfully employed, and mean that in less than 33 years we shall have more individuals 45 years of age than the total number employed at the present time. But if we do nothing about it and maintain present-day working standards and conditions we shall have a potential labor surplus of over 30 million workers by 1980. We must anticipate the continued introduction of new labor-saving devices perhaps on a scale never dreamed of before. The technologies recently developed, particularly in electronics, and the upswing of interest in science generally should provide for that. Despite the new industries that will result, one seriously doubts that the advances in science will have the effect of increasing man-hours of available work in relation to the man-hours of available workers both willing and able to work, as John L. Lewis puts it.

'Our society has been quite illogical and inconsistent in its attitude toward the older worker. On the one hand, it is apparent that we have no objection to electing and appointing older individuals to positions of the greatest responsibility in government, business, and the professions. For instance, in the last Congress 32 Senators, or 41.3%, were over 65 years of age; 12, or 15.3%, 61 to 65 years of age—in other words, over 56% were over 60. In the House of Representatives, 57, or 21.3%, were over 65 years of age, and 36 representatives, or 13.4%, were 61 to 65 years of age, making a total of almost 35% over 60. A study was made of top business executives as listed in Poor's Directory. Taking 500 executives names contained therein, it was found that 143, or 28.6%, of those listed were over 65 years of age, 78, or 15.6%, were between 61 and 65 years inclusively. Here again, over 44% were over 60 years of age.

'And yet, on the other hand, as far as the rank and file of workers is concerned, we have no objection to the imposition of blind and unselective compulsory retirement rules which automatically eliminate those in the ranks who have reached the

same age regardless of their fitness, ability, and contribution to the group for which they labor. Training and experience can only be replaced by training and experience, and when we retire a competent older worker, his successor has the burden, inevitably, of supporting him as well as himself. Some individuals welcome retirement, and the possibility of voluntary retirement on a pension should always remain open for these. But, if the premise is that all individuals over 65 or 70 are not worth their keep, then least of all should we permit individuals above those ages to occupy the top and critical positions in our social structure. If we acknowledge, as is certainly true that some are, and some aren't, fit and pulling their weight at those ages, then we should use our intelligence to devise methods of determining which are, and which aren't, fit for all workers, not just the upper crust. At the present time our life expectancy is 67 years. As medical science progresses we may expect the life span to increase to limits hardly dreamed of. We might even look forward to the experience of an interesting person who was, in non-medical terms, "quite a fellow." His name was Christen Jacobsen Dragenberg. He was a Dane who lived to be 146 years of age, from 1626 to 1772. He went to sea when he was 13, took part in the wars of three kings against Sweden, served many nations in merchant navies, when nearly 70 was taken prisoner by Algerian pirates, was sold as a slave, escaped slavery after 15 years, and at the age of 84 again went to war against Sweden. At 111, he married a woman of 60, outlived her, proposed at 130 to several women but was rejected. If one man can live a life as full as this, there is no reason why science cannot make it possible eventually for many more of us to marry at 111, propose and be accepted at 130, and live to 146.

'The argument has been advanced that we must clear out the older workers to make room for the younger men so that their progress upward in an organization will not be unduly stymied. On the face of it, this line of reasoning appears to have some merit. But it is only another way of stating that there are more workers than there are jobs. That is always true, and it will be just as true if we force everyone to retire at 50 or even 45, as we will have to do by 1980, if we don't find a more logical way of reducing the disparity between jobs and workers. We must not lose sight of the fact that someone must support those that we retire to idleness. The more workers we retire, and particularly if we should lower the retirement ages, the greater will be the economic burden we will place on those who work. In a refined and delicate way it is a perpetuation of the jungle law of the fang and claw where the leaders of the pack survive only until the younger beasts grow fierce enough to eliminate them. In modern civilization, we are less violent, but the end result is approximately the same.

'One of the most important steps in solving this problem is the successive reduction in working hours for all workers rather than by reducing more and more older workers to a state of parasitism.

'Another view that is widely held is that older individuals become over-conservative, and to make progress we must eliminate these obstacles in the path of progress. Here again there are such wide variations in human reaction patterns that we cannot see how one can logically draw generalizations that will fit individual cases. Certainly Bernard Baruch, 78 years of age, Serge Koussevitsky, age 74, Arturo Toscanini, age 81, Herbert Hoover at 74, are no obstacles in the path of progress.

'Fortunately the idea that compulsory retirement on a calendar age basis is wrong, is gaining general acceptance. The National Health Assembly on May 4, 1948, unanimously adopted the recommendations on the subject which the author had the privilege of making. No one is in a better position than you to carry these ideas to your employers. It is up to industry to lead the way. Ideas are sterile until we act on them.

'What we are talking about is not an excursion into the realms of charity nor merely an exercise in human compassion. We are talking about something that will pay off. For instance, if we employ one-fifth of the 21 million over 65 years of age which we will have by 1980, at, let us say, an average of $2500 per annum, it will mean 10 billion 500 million dollars per year that they will earn for themselves and which load of support will largely be taken off the shoulders of other younger workers, whether by taxes or direct contributions.

'During the past decade, industry and our Federal and state governments have made great advances in provisions for the care of the aged. The essayist is hopeful that the major burden of this can be carried by the extension of voluntary retirement plans in which the employer and the employee share the cost. Not only must more realistic retirement benefits be provided, but such plans must be more widely adopted by employers generally.

'This paper has only one purpose; to emphasize the growing importance of the problem of the aged and chronically ill. It is a plea for the devotion of more thought, more research, and more funds to improve the lot of the largest and most neglected group of unfortunates in our society. It is from those interested in industrial hygiene that we may expect leadership in this endeavor.'

The remainder of the afternoon program had for its topic "Prime Factors in Industrial Relations," with MR. V. P. AHEARN presiding.

Industrial Health Legislation

MR. THEODORE C. WATERS discussed "Industrial Health Legislation in 1948."

'This has been an off-year in state legislation, as the legislatures of only 10 states met in regular sessions. There have been but few important changes in state workmen's and occupational disease compensation acts, but numerous court decisions have been rendered construing compensation acts and determining the liability of employers for the payment of compensation. In some states legislative commissions have been appointed for the study of proposed amendments to compensation statutes, and it is to be assumed that these commissions will prepare and file their reports before the 1949 legislative sessions.

'During 1949 all of the state legislatures except four, Kentucky, Louisiana, Mississippi and Virginia, will meet in regular session, and our Committee wishes to call this to the attention of the members and suggest that the legislation dealing with matters of industrial health be carefully followed, so that you may be informed upon this subject in the states wherein you conduct your operations.

'This report will include reference to state legisla-

tion enacted during 1948, the activities of legislative commissions appointed for the purpose of making reports to the 1949 legislatures, and state departmental activity with respect to the preparation of codes of industrial hygiene.

'The state of Mississippi enacted a Workmen's Compensation Law, which was approved April 13, 1948, effective January 1, 1949; this is the last state in the Union to enact such a statute. The law is compulsory for both employers and employees, and common law defenses have been abrogated. The employer is given the privilege of self-insurance or insurance with private carriers. The law does not provide compensation for occupational diseases, being limited to benefits for accidental injury or death. The maximum and minimum weekly compensation payments total, respectively, $25.00 and $7.00, with the limitation for total disability, partial disability or temporary disability to 450 weeks or a maximum total payment of $8600, whichever is less. The law is administered by the Workmen's Compensation Commission.

'No new occupational disease compensation statutes were enacted during the year 1948, so the report of our Committee as of last year with respect to this remains the same, in that there are now 39 states[1] and Federal jurisdictions in which occupational diseases are compensable in some form. Reference is made to the fact that of these states 23[2] provide compensation for a scheduled list of diseases, and 16[3] provide so-called general coverage; in two states, Tennessee and Virginia, an employer may elect general coverage. In 22[4] of these states specific provision is made for the appointment of medical boards and medical examiners charged with the duty of examining the claimant or hearing conflicting medical testimony for the purpose of expressing an opinion upon the medical features involved in the claim.

'In the state of New Jersey there was enacted Senate Bill 306, which extends the time within which an employee must give notice to his employer that he has contracted a compensable occupational disease and time within which he must file formal claim for compensation with the workmen's compensation bureau. Prior to this amendment an employee had five months from the date when he ceased to be subject to exposure to an occupational disease hazard in which to give his employer notice; by the amendment notice is effective if given "within 90 days after the employee knew or ought to have known the nature of his disability and its relation to his employment." Under the law effective prior to the amendment an employee was required to file claim for a compensable occupational disease within one year after the date on which he ceased to be exposed to the occupational disease for which compensation was claimed; by the amendment the claim must be filed within two years after the date on which the employee ceased to be exposed to the compensable occupational disease or "within one year after he knew or ought to have known the nature of his disability," whichever period is later in duration. However, all claims for compensation for compensable occupational diseases are barred unless petition for same is filed with the workmen's compensation bureau within five years after the date on which the employee ceased to be exposed in the course of employment with the employer to the occupational disease.

'This amendment is not applicable to cases of total disability or death as the result of silicosis or asbestosis. With respect to these diseases, compensation is only payable for total disability or death which resulted within three years after last injurious exposure to the disease. Claim for compensation for these diseases must be filed within one year from the date of disablement or death.

'During the present year occupational disease legislative commissions have been appointed in the states of Vermont, Maryland, New York and Montana, with directions to report their finding prior to the 1949 legislative sessions in those states. To date no reports have been submitted, but for those member companies operating in these states it would be advisable to keep informed as to the activities of these commissions.

'Of particular importance is the activity of the commission appointed in New York State to study the subject of determination of partial disability from dust diseases, and to determine whether or not it is feasible to include in the law provisions for compensating partial disability. You will recall that one of the features of the New York law is to provide compensation only for total disability or death from these diseases, and this provision has served as a model for a number of other industrial states that provide compensation for silicosis and asbestosis.

'Just when the report of this New York commission will be forthcoming cannot be predicted. but it will be of great interest to those industries having potential dust hazards.

'In New Jersey, the State Department of Labor has prepared and is considering the adoption of rules and regulations governing the prevention of silicosis in industry. Tentative drafts of this code have been published and submitted to various industrial organizations for criticism and comment. It is probable that some action with respect to final approval of the code will be taken during the present year.

'When promulgated, it is the purpose of the Legal Committee to prepare a bulletin outlining its features for distribution among those companies operating in that state.

'The State Department of Health of New Jersey has also prepared a proposed industrial hygiene code, and in January of this year public hearing were held upon that matter in Trenton. No final action was taken by the department, and there is no indication as to what their ultimate purpose may be with respect to its adoption. When final action is taken by the department, our committee will prepare a bulletin for submission to members.

'Your attention is directed to the preparation of a proposed uniform industrial hygiene code, which was recommended to the AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS by its Committee on Industrial Hygiene Codes on March 30, 1948. The Conference has distributed copies of the

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1. Ariz., Ark., Calif., Colo., Conn., Del., Fla., Ga., Idaho, Iowa, Ill., Ind., Ky., Maine, Md., Mass., Mich., Minn., Mo., Nebr., Nev., N. H., N. J., N. M., N. Y., N. C., N. D., Ohio, Ore., Penn., R. I., S. D., Tenn., Texas, Utah, Va., Wash., W. Va., and Wis.
2. Ariz., Ark., Colo., Del., Ga., Idaho, Ky., Maine, Md., N. H., N. J., N. M., N. C., Penn., R. I., tah, Va., W. Va., Iowa, S. D., Texas, Tenn., and Nevada.
3. Calif., Conn., Fla., Ill., Ind., Mass., Mich., Minn., Mo., Nebr., N. Y., N. D., Ohio, Oregon, Wash., and Wis.
4. Ariz, Ark., Colo., Ga., Idaho, Iowa, Ky., Maine, Md., Mich., Minn., Nevada, N. Y., N. C., Ohio, Oregon, Penn., R. I., S. D., Texas, W. Va., and Wis.

proposed code to various industrial organizations for comment and criticism, with the prospect that some further action will be taken by the Conference next year. The code is exceedingly broad, purporting to regulate working conditions for the purpose of minimizing hazards to the health of workmen. The AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS apparently has recognized the desirability of greater uniformity of such regulations in the different states.'

Current Trends in Social Legislation

MR. HARRY G. WALTNER, JR., gave the last paper of the annual meeting program on the subject "Observations on Current Trends in Social Insurance Legislation."

'In the field of social security, as in other fields, it is necessary in observing trends that we look at many issues and problems involved at the same time. Some of these have been, for example, the Railroad Retirement Act, the Social Security Act in 1935, the Unemployment Compensation Laws in the various states during 1936 and 1937, the efforts of Congress during 1943 to establish a widely inclusive national social insurance system, the National Health Insurance Act of 1946, the Crosser bill, the National Health Act of 1947 introduced by Senators Taft, Ball, Smith and Donnally, the Taft-Fullbright bill establishing a cabinet position of Health, Education and Security, and finally just to mention other bills, 114 bills in the general field of social security introduced in the House in 1948, and 79 in the Senate.

'About a year ago the Chairman of the Senate Finance Committee, which has been responsible for the consideration of social insurance measures in the Senate, appointed an Advisory Council headed by former Secretary of State Stettinius, requesting that that group bring forth recommendations for generalization and improvement of our social security program. That committee has delivered three reports.

'The first report covered major changes in the existing old age and survivors' insurance phases. One of the problems receiving attention was the alleged inadequacy of the benefits provided; also very substantial liberalizations were recommended in this report—for example, under the existing act the maximum family monthly benefit is $85.00—the recommendations in this report make it possible for family benefits to be approximately $220 per month. Perhaps one of the most controversial recommendations stated that when current benefits paid out under the contributory insurance system exceeded the 4% tax paid by employers and workers, the deficits which then occur should be made up out of an appropriation from the general revenues of the government.

'The second report of the Advisory Council recommended the establishment of an insurance system of permanent disability benefits as an adjunct of the existing old age and survivors' insurance program.

'The third report dealt with public assistance, incidentally a field which business unfortunately has largely neglected.

'With respect to some of these specific trends, there is one which aims to deal with one phase of the problem without giving consideration to the effect of the changes that have been considered upon other complementary problems—this is a tendency which should be stopped if it is possible to do it. Another area in which we are interested is the employment insurance field in which changes have come about in two aspects of the legislation, one concerning the amount of benefits provided to individuals who are unemployed and the other involving the establishment of more effective safeguards surrounding the payment of benefits. A relatively new trend is also evidenced, involving state legislation providing for temporary disability benefits.

'Reviewing the history of some of these compulsory systems of temporary disability benefits, in 1942 the State of Rhode Island passed a state-wide law —more recently, two other states have adopted similar programs, California in 1946 and New Jersey in 1948. There are, as is well known, three general types of compulsory temporary disability programs: the first might be referred to as the monopolistic state fund program as presently in effect in Rhode Island; the second might be referred to as the California or the optional state fund type of law; and the third might be called the publicly-supervised, privately-operated program.

'Some of the major principles which should be considered in thinking of this type of legislation might be summarized as follows: first, it should provide for maximum flexibility, since conditions in various industries and with respect to employers in the same industry vary materially—it is thought by many that the publicly-supervised, privately-operated program provides the maximum of flexibility. Second, there is great doubt that any genuine need exists for the state to establish a state-operated fund for the payment of temporary disability benefits, since experience has shown that private enterprise is fully capable of meeting this need of employees. Moreover, government should not enter into an activity unless the needs are beyond the ability of private enterprise to handle them. Third, experience rating should be incorporated into these plans—this is present in the New Jersey law, but is absent in both the California and the Rhode Island provisions. Fourth, consideration should be given to the beneficial social effects of financial contributions to the plan by the employer —it seems obvious that the best way to insure a desirable result in gaining the interest and active support of the employer is for him to have a part in financing the plan. Finally, the benefit formula and other provisions of the law should recognize the sound practices and principles which have been developed over 30 years or more of operation of private plans, both insured and self-insured. There is a trend in this respect—in the area of temporary disability benefits, there is a tendency to follow the unemployment compensation law, its eligibility and benefit provisions, rather than to adopt these eligibility and benefit provisions developed through the operation of voluntary plans.

'The over-all trend in legislation—if one can determine a trend in the short space of five or six or seven years—seems to be in the direction of a sounder program. This means that legislation is interpreted in New Jersey as being substantially in advance of California, and the California legislation represents a great advance over that of Rhode Island.

'All the trends in social security clearly indicate a greater need for businessmen and for industry to become better informed and more actively interested

in the problems of social insurance, so that the initiative and experience of businessmen may be directed to their solution. When such a degree of interest has been invoked, we can expect further developments to be based upon sounder principles, to give greater recognition to business and industrial problems, thus providing the basis for more effective and economical administration and operation of the programs. The stake of business in social security problems is a great one—the decisions to be made may involve in no small degree the preservation of our dynamic economy. This is worthy of our careful study and our active participating interest.'

Summary

FINALLY, in completing the very excellent program, MR. V. P. AHEARN gave a summation, stating, in part, that a point which stands out is that health and safety are of more concern to the people of the United States today than ever before. Contrary to expectations in many quarters, the speaker was convinced that the Taft-Hartley Act is not going to be repealed in the sense that it will be taken from the statute books and nothing else substituted for it. For one thing, the new law, called by some other name, is going to continue the principle of health and welfare funds as a sound public policy. It was the conviction of the speaker that the Congress of the United States will not leave the administration and supervision of such funds, designed to bring health, welfare and security to the employees, to the unsupervised jurisdiction of labor unions.

This does not mean that all questions are going to be covered hereafter by law. Unions are going to continue to press for retirement funds, and for pensions and other welfare arrangements of that character, and management—whether it particularly likes it or not—is going to be required to bargain collectively with unions on the subject of health and welfare.

But realistic employers will see that there is a trend which they cannot possibly stop. They can, however, shape and influence and direct it. After all, most employers concluded many years ago that the maintenance of health and safety in industry is just good business, because an appropriate regard for health and safety in the industrial plant is the foundation for good employment relationships, and certainly good employment relationships are absolutely essential to good public relations. For many years, the mining industry shared the common misapprehension that public relations were something which called for the expenditure of several hundred thousand dollars by a big corporation for elaborate and costly advertising in popular magazines. It is apparent now that this is of little importance in any program of public relations. Good public relations start inside the plant and, they must start with executive responsibility for health and safety.

Once management was responsible only to the stockholders. As time passed, however, it became clear that management was also responsible to its employees. This idea is pretty well behind us now as an accepted fact. Today we must recognize a third responsibility, to the public. There is a public interest in the way we do business, in the way we in the mining industry, for example, leave lands after we have moved all of the recoverable minerals, and in many other things. Management does not resent this wide public interest; it sees it is inevitable, and if there is one thing management has always shown a capacity to do, it has been, eventually at least, to grapple with these problems realistically.

If there is one thing that distinguishes the United States—and it is felt that management can claim its proper share of the credit for that distinction—it is that we have a regard for human life, a regard for saving and protecting human life. Our country—as those of you who have been abroad recently have discovered—has a special distinction of leadership in this field.

During the coming year there is going to be a greater need than ever before to save and protect life. We face the reality of a manpower shortage of unparalleled proportions in 1949. This country is committed to a policy of defense having bipartisan support. As a matter of fact, the Congress was well ahead of the executive branch of the government during the year just ended, in its desire to have this country prepare itself adequately for any kind of eventuality. We have not yet felt the full impact of funds already appropriated for national defense, but as industry begins to move and as manpower is drawn into the defense industries, we shall experience a shortage of manpower utterly unknown in World War II. Our commitments are not for defense alone; there are others for relief of friendly Western European countries, not to mention Greece, Turkey, China, and Korea. We are not sending dollars to those countries; we are sending things we make here, and to make them and transport them we must have manpower.

In conclusion, MR. AHEARN said that the one thing he was carrying away from the meeting is that management is by no means downhearted. It sees a big job ahead, and among the important things which will continue to occupy the concern of management is the maintenance of health and safety, because they are both just good business.

MR. MCMAHON then closed the meeting with a brief statement.

'If this meeting has not answered the question, "How Big is Our Job?" it has shown the magnitude of the field and the opportunities which industrial health affords.

'For one final answer to that question, "How Big is Our Job?" the speaker referred to the last lines on the back of the program, "....greater industrial security and productivity which are so necessary to a survival of our free society," by Louise Rutherford, Deputy Attorney General of the Commonwealth of Pennsylvania.

'With that stirring thought, we bring this session to a close. The Thirteenth Annual Meeting of the members of the Industrial Hygiene Foundation stands adjourned.'

ASSOCIATION NEWS

The Detroit Convention

PRELIMINARY Programs of the April 3-8, 1949, Detroit Convention have been mailed to all members and many more. If you did not receive your copy, or can place additional copies in the hands of interested persons, please write for same to the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS' offices, Room 1300, 28 East Jackson Boulevard, Chicago 4, Illinois.

The advance room reservations in Detroit indicate a record attendance of all participating groups. The Detroit Convention will be unusual and outstanding because of several special features. There will be entertainment and special opportunities for the wives and lady guests to become really acquainted with the City of Detroit, its people and their cultural as well as business achievements. Be sure to bring the ladies along to this meeting. Other special features are the *Plant Tours* that are being arranged on Friday, April 8, and numerous other *Plant Tours* on Wednesday and Thursday. Medical Departments of all sizes, serving a great variety of plants, will be on display. Also all the interesting assembly lines and methods of the modern industrial plants as best developed in the Detroit area will be visited.

The *Hospital Clinics* will be most instructive and overflow crowds are assured. *The Section Meetings* are new this year, and offer an opportunity for those interested in special fields to discuss their particular problems.

Suggested programs of these section meetings are planned as follows:

Tuesday Morning, April 5, 1949

INGENIOUS and Unusual Devices for Use in Industrial Medical Departments"—O. J. PRESTON, M.D.; KENNETH SMITH, M.D.; G. E. KOHLER, M.D.; F. BARKMAN, M.D., General Motors Corporation.

"Are Annual Physical Examinations in the Automobile Industry Desirable?"—WIRT A. DAWSON, M.D., Physician-in-Charge, Ford Motor Company, Rouge Plant.

"The Relative Infrequency of Occupational Dermatoses in Automobile Workers"—J. R. ROGIN, M.D., Dermatologic Consultant, Chrysler Corporation.

"The Ocular Effects of Ultra-Violet Radiation"—CHARLES F. KUTSCHER, M.D., Assistant Professor of Ophthalmology, School of Medicine, University of Pittsburgh.

"The Effects of Electricity on the Human Body"—W. B. KOUWENHOVEN, Dean, The School of Engineering, Johns Hopkins University.

Discussion of the last two papers to be opened by either T. LYLE HAZLETT, M.D., Medical Director, Westinghouse Electric Corporation, or B. L. VOSBURGH, M.D., Medical Director, General Electric Company.

MARION W. JOCZ, M.D., Section Program Chairman.

Tuesday Afternoon, April 5, 1949

RESPIRATORY Hazards in the Steel Industry and Their Relation to Pulmonary Disease"—E. H. CARLETON, M.D., Medical Director, Inland Steel Company.

"The Administration of Pulmonary Disease Control Program"—(1) "In a Large Steel Plant"—M. P. CHARNOCK, M.D., Plant Surgeon, Bethlehem Steel Company, Bethlehem, Pennsylvania (2) "In a Multiple-small-unit Industry"—L. E. HAMLIN, M.D., Medical Director, American Brake Shoe Company.

"Pneumoconiosis and Pulmonary Disease"—ARTHUR J. VORWALD, M.D., Director, The Saranac Laboratory, Saranac Lake, N. Y.

"Medicolegal Aspects of Pulmonary Diseases"—LEE J. SCROGGIE, Attorney, Lacey, Scroggie, Lacey & Buchanan, Detroit, Michigan.

"Pneumonia in the Steel Industry"—W. H. RICE, M.D., Chief Surgeon, Armco Steel Corporation, Ashland, Kentucky.

"Tuberculosis and Silicosis in the Steel Industry"—Speaker to be announced.

Questions and Discussion—The speakers will sit as a panel to answer questions. Active participation in the discussion is expected of all who attend the meeting.

PAUL BAMBERGER, M.D., Section Program Chairman.

Tuesday Afternoon, April 5, 1949

INTRODUCTION by Section Chairman R. C. PAGE, M.D., Standard Oil Company (N. J.), New York.

"Preventive Medicine in Action in a Chemical Industry"—Members of the Medical Staff, Merck and Co., Inc., Rahway, N. J.

"Assessment of the Employee—A Continuous Process"—J. M. CARLISLE, M.D.

"Experiences in Placing and Keeping the Medically Handicapped at Work"—S. M. HOCH, M.D.

"Dangerous Processes Made Safe"—N. G. WHITE, PH.D.

"Acrylonitrile Poisoning"—REX H. WILSON, M.D., B. F. Goodrich Company, Akron, Ohio. Discussion of Foregoing Papers.

Panel Discussion—Interpretation of Medical Information to Company Personnel: JAMES H. STERNER, M.D., Panel Leader, Eastman Kodak Company, Rochester, N. Y. ALLAN J. FLEMING, M.D., E. I. du Pont de Nemours & Company, Wilmington, Delaware. L. C. HATCH, M.D., Goodyear Tire and Rubber Company, Akron, Ohio. J. P. HOLT, M.D., Standard Oil Company, (N. J.), New York, N. Y. R. EMMET KELLY, M.D., Monsanto Chemical Company, St. Louis, Missouri. ARTHUR F. MANGELSDORFF, M.D., American Cyanamid Company.

Association of Mine Physicians

TIME of meeting to be arranged by DR. CHARLES B. STACEY, Pineville, Kentucky, and DR. GEORGE W. EASLEY, Williamson, West Virginia, as suggested at a meeting of the ASSOCIATION OF MINE PHYSICIANS. Although details are not available at this time, a very excellent program of special interest to Mine Physicians is assured.

Report of the Public Relations Committee

AS YOU know we have been devoting as much time as possible to the selection of a new name which we can recommend for adoption by our Association. In the course of that activity we received a number of interesting and valuable suggestions from various members who had written to the President or Secretary concerning a proposed name change. DR. WILLIAM D. BUTT, of Toronto, proposed that a new

word, *emporiatrics*, be adopted to designate the specialty now commonly called industrial, or occupational, medicine and that the new name of the specialty be incorporated in the name of the Association. DR. C. E. MARTIN, of New York, also suggested a new name for the specialty, and that the specialty name be incorporated in the name of the Association. He proposed the word, *ergiatrics*.

The question of coining a new word was taken up with the G. & C. Merrian Company, publishers of the Webster dictionaries, and their expert, DR. EDWARD ARTIN, informed us that both *ergiatrics* and *emporiatrics* would be quite acceptable from the standpoint of derivation. He very kindly suggested a third name for the specialty, namely, *poniatrics* (pronounced with a short o, as in pond).

Your committee held its last meeting in Washington, January 10, and as a result of our study of this problem we recommend that: (1) Before changing the name of the Association a word be coined, and adopted, which would properly designate the specialty of industrial medicine, or occupational medicine, but that words proposed for this purpose be given suitable publicity and discussed by all interested persons for several months before one is accepted by us. (2) Some time during 1949 the officers and directors of our Association, together with other persons in the field who can be induced to cooperate in this matter, adopt this new word as a name for our specialty and attempt to promote its general use. (3) Following adoption of a word to designate our specialty, such word be incorporated in a new association name, which should then be adopted by the Association.

Although only two meetings were held during the year, considerable study was given to our problems, and contacts between members of the committee were frequently made by telephone and correspondence. We regret, that, owing to the pressure of imperative duties, we were not able to give serious study or take action concerning various other problems which we had been asked to work on.

—CHARLES E. DUTCHESS, M.D., Chairman
R. LOMAX WELLS, M.D.
C. O. SAPPINGTON, M.D., DR.P.H.
ALLEN J. FLEMING, M.D.

DR. DAVID LIU, of Elecle, Kauai, T. H., died February 9, 1949, at the age of 48 years. He received his M.D. in 1930 at the College of Medical Evangelists, Los Angeles. He has lived on Kauai for 10 years, and has been associated with the McBryde Sugar Plantation for four years.

DR. DANIEL EDWIN SABLE, 3700 Fifth Avenue, Pittsburgh, died in Mercy Hospital, Pittsburgh, December 11, 1948, of carcinoma of the sigmoid. He graduated in Medicine at the University of Pittsburgh in 1907. He was Medical Director of Rieck-McJunkin Dairy Company, Kraft Cheese Company, and Hotel Pittsburgher, and Chief Surgeon for the Department of Public Safety, City of Pittsburgh. He served in World War I at Langres, France, and was a member of the staff of Mercy Hospital, Pittsburgh. He has been a member of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS since 1940.

BOOKS

Industrial Health Engineering

INDUSTRIAL HEALTH ENGINEERING. By ALLEN D. BRANDT, B.S., SC.D. John Wiley & Sons, Inc., New York, 1947. 395 pages, cloth. $6.00.

THIS is a book which will appeal primarily to the industrial hygiene engineer, as the title indicates. The subject matter is devoted especially to the discussion of industrial atmospheric contaminants and their control, including detailed data on the design and installation of equipment for the control of environmental hazards produced by atmospheric contaminants.

There are 145 diagrams, charts and photographs which are well used in adapting these devices to selected industries.

The chapters include a discussion of industrial atmospheric contaminants and their industrial hygiene significance; evaluating industrial atmospheric health hazards; principles of control and methods employed; general ventilation; local exhaust ventilation—hood design; design of local exhaust systems; collectors; exhausters; measuring air flow in industrial ventilation; control measures for common operations and for an industry; exhaust systems, specific design data and illustrations of installations; respirators and protective clothing; heating, ventilating and air conditioning for temperature, humidity, comfort and odor control; radiant energy; industrial illumination; industrial noise and its control; plant sanitation and hygiene. There is also an extensive bibliography of 221 references; and an appendix with various types of tables, including conversion values for gases and vapors; other conversion factors; approximate composition of some organic solvents used as thinners; recommended exhaust values in conveying velocities for a variety of contaminant-producing equipment; atomic symbols and weights; condensed table of logarithms, and other useful diagrams and illustrations.

Much of the material in this book has been used by engineers in actual installations, and some of it has been reproduced through the courtesy of the New York State Department of Labor, Division of Industrial Hygiene and Safety Standards, as well as from Dalla Valle's work. The author contributes freely of original material from his own experience.

This book should be of considerable value to industrial hygiene engineers, particularly with respect to the control of atmospheric cantaminants through the use of detailed data on the design and installation of ventilation equipment.

—C. O. SAPPINGTON, M.D., DR.P.H.

INDUSTRIAL MEDICINE

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Volume 18 MARCH 1949 *Number 3*

The A.M.A. Program

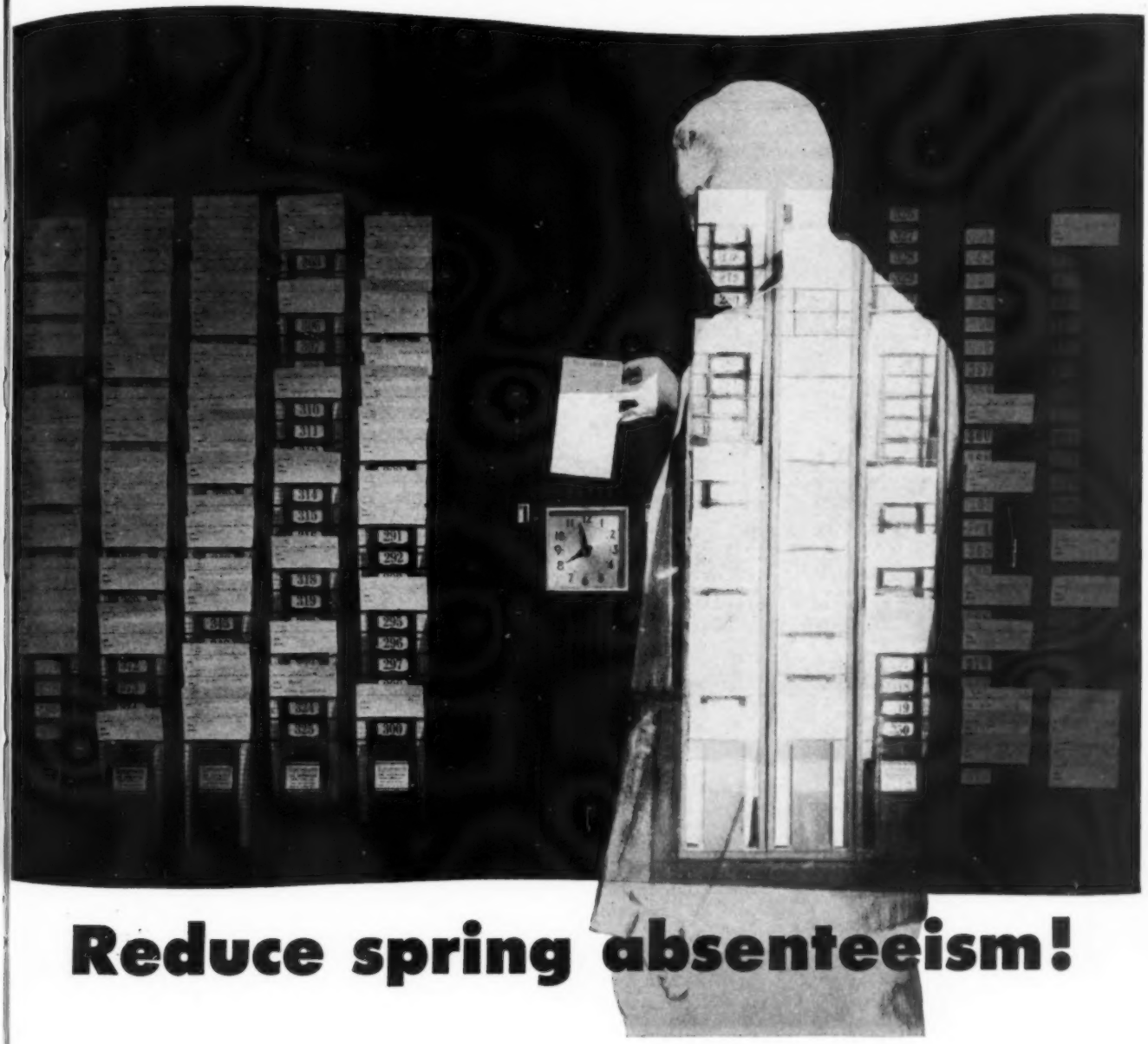
THE American Medical Association's plan "for the advancement of medicine and public health" appears on page 108. This is the crystallization of many ideas, some of which have been advocated for a long time. Thus, during more than 75 years the A.M.A. has been urging the creation of a Federal Department of Health of cabinet status, "in which all Federal health agencies could be coordinated and integrated." The plan has been given wide publicity; it was a front-page feature in most of the metropolitan newspapers. This will make a lot of people "medicine" conscious. And section 11, "Greater emphasis on the program of industrial medicine . . . ." will, it is hoped, make them also "industrial-medicine" conscious. For only a small proportion of even those most interested in health matters have a clear notion of the present vast coverage of industrial medical services—to say nothing of their unlimited possibilities.

Hell Bent

DR. THEODORE KLUMPP'S presentation on "The Older Worker" (page 124) is a statesman-like analysis of a problem which should be engaging the attention of the statesmen in our government—if we have any. Ours, such as they assume to be, continually urge us to greater and more efficient production while they assiduously make it easy, and often necessary, for more and more to join the ranks of the unproductive. The total of payments for pensions, unemployment compensation, and other relief benefits is now 11 billions a year, 5% of the national income, as compared with 1.5% in 1929. This "total exceeds all dividends paid to shareholders in American corporations." And it is steadily growing. A Harvard economist notes that "the growth in pensions and relief payments means that a much larger proportion of the country's production is being assigned on the basis of need. Thus the demands upon industry are larger than ever and can be met only by an expansion in productive capacity." But with constantly increasing taxes on the working segment of the population to pay for the greater "security" of the non-working, the purchasing power of both will inevitably decline. Who then will be able to absorb the greater production? Small wonder that many who have the brains to think beyond the next election are becoming pessimists. The others, bent on "social welfare" at any cost "do not foresee, or do not wish to consider, the ultimate tragic results. They are hell-bent, and nothing can stop them."

The "Right to Work"

DURING the recent Congress on Industrial Health, in Chicago, there was a luncheon session of the Business Problems School, of the Chicago Association of Commerce and Industry, at which DRS. C. D. SELBY, WILLIAM A. SAWYER, and HAROLD A. VONACHEN talked on "Current Problems Affecting Workers' Health." Following their remarks, MR. C. C. MURPHY, of the Labor Welfare Service, Council of Social Agencies, spoke of the "right to work." With reference to the individual, he asked, "Does he have a right to work?" Then he said, "I don't believe so. . . .His only right is *the right absolutely to withhold his labor.*" This is an example of straight thinking. The right to refrain from working, to quit working, to join in a refusal to continue working, *is the only absolute right* possessed by every man. It may, in certain circumstances, be all he has. But it is *his*. And it will remain his until he asks the politicians to make good on their vote-getting shibboleth that he has also the right to work, and help him ignore the qualifications of this alleged right by putting him to work. Any one who doesn't believe that he, then and there, will begin to lose his right to withhold his labor has only to observe the regimented, socialistic, or communistic state. The memory of how close we came to losing it in this country is all too fresh. . . .



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NEWS, COMMENT, OPINION

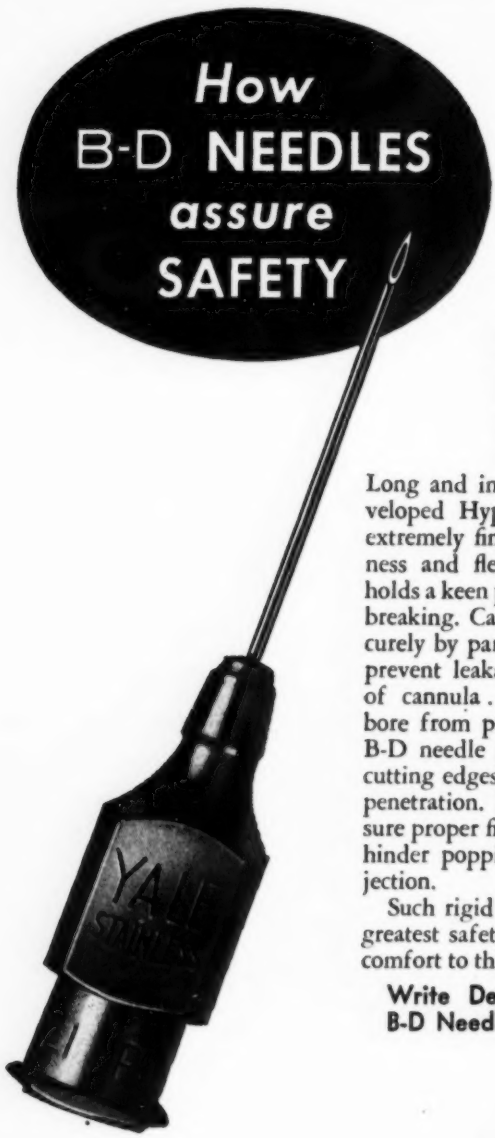
THERE are no records of heat prostration or sunstroke in Florida, and California never lost a resident in a hurricane.

—*The Thread of Life*, January, 1949.

Older and Safer

OLDER workers have better records in both injury and absenteeism rates than younger employees. That's the finding of a recent Bureau of Labor Statistics survey. This is particularly reassuring news for plant personnel departments right now, for the tight labor market has set many companies to hiring older workers again. Here's what the BLS report shows: A 55-year-old male employee, for example, takes only half as much time off from the job as does the youngster under 20. He is sick more often, but illness accounts for only one-third of all absences. The steadier, more settled work record of the older employee offsets the time he loses because of illness. Among women, absenteeism also declines with age, but not so sharply. Workers in the late 20's are injured most often. Thereafter, the injury rate (particularly for the more important class of non-disabling injuries) drops rapidly. The frequency rate of injuries for workers over 60 is less than one-third that for workers in the late 20's. (One reason, of course, is that many of the older workers are shifted into less hazardous jobs.) Once they are hurt, older workers take longer to recover. They may require, on an average, 50% more treatments per injury than younger employees. But this still isn't enough to offset their better showing in safety performance.

—*Business Week, September 11, 1948, quoted in Management Review*, January, 1949.



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—*Industrial Health Bulletin*, Department of National Health and Welfare, Ottawa, Canada, January, 1949.

Bureaucracy

A MINOR example of the advantages of bureaucracy was my experience of applying to the appropriate segment of the Ministry of Health in Whitehall for certain special instruments to perform an operation by a hitherto untried method. The whole project was explained in some detail, and the letter of request received a prompt postal reply promising consideration. Eight months later long after I had obtained the needed articles from a private source, I had a letter declining the request because the instruments I needed were not part of the usual neurosurgical set-up.

—From "Medical Practice in Great Britain," by WILLIAM H. SWEET, M.D., in *New England J. Med.*, February 3, 1949.

Case Finding

THE industrial physician is not likely to encroach on private practice, as many physicians contend, even though he does treat an occasional non-industrial ailment. This is the opinion of DR. LEONARD J. GOLDWATER, professor of industrial hygiene, Columbia University. There is some evidence, says DR. GOLDWATER, that the plant doctor helps his private colleagues by detecting illness during check-ups and referring the patients to their family physicians. By way of proof, he cites a study of two industrial firms of similar character, size, personnel, etc. Both provided sickness insurance for their employees, but one had an in-plant physician. In 1947, 17% of employees in the doctor-serviced plant sought private medical care (about $5,000 worth), while only 7.6% of workers in the doctorless factory sought private medical care (about $3,000 worth).

—*Medical Economics*, February, 1949.

Interesting, Isn't It?

ACCORDING to HOWARD A. RUSK, M.D., in 1948 the Federal Department of Agriculture will spend $52,000,000 on agricultural research; industry will spend $450,000,000 on research to improve manufactured products. The total spent by the government and all private foundations, etc., on medical research will be $28,000,000. This is: 1/300 that spent on alcoholic beverages; 1/6 that spent on phonograph records; 1/3 that spent on non vending coin machines; 1/2 that spent on monuments and tombstones. —*Connecticut State Med. J.*, January, 1949.

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Industry's Blindness

THERE are approximately 8000 living Americans who are blind in both eyes as a result of industrial accidents, and 80,000 who have lost the sight of one eye for the same reason according to DR. LEONARD GREENBURG, executive director, Division of Industrial Hygiene and Safety Standards, New York State Department of Labor. Addressing the annual meeting of the National Society for the Preven-

tion of Blindness, DR. GREENBURG said there were 2381 "compensated eye injuries" in New York State alone "during a recent year." Total amount of compensation for these cases, he said, exceeded $1,500,000. It is estimated that 4500 to 5000 permanent eye injuries occur in this country each year and that there are approximately 70,000 to 100,000 temporary eye injuries of various kinds.

—*New York World Telegram*, December 10, 1948.

We Must Hold Out

WHAT can we as physicians do? We are a minority group. Let us not forget that the difference between success and failure is often minute. However small our efforts, let us lend them. Already there are evidences of reaction in Britain and on the continent. We must hold out until the public has more accurate knowledge of socialism, and may we hope that this will not be gained first hand. We must hold out until our farmers have talked with men like themselves in England, who know what it is to secure a permit to slaughter a lamb for their own use, to plant and harvest according to the directions of the Minister, and penalty for failure being loss of one's land. The laborer must have time to talk to men like himself who like the miner, since the nationalization of mines, now has only one possible employer and can not turn to a friendly government for aid. The union member must have time to talk to those who have seen the windows and doors of union halls plastered with signs reading, "Stop the spread of socialism." He must talk with men who have felt the threat of devaluation of the pound in an empty stomach. He must learn that 50% of the votes given to the conservative party in England in 1945 were cast by people who earned less than $20 a week, 30% by people who earned less than $40 a week. These people have learned of socialism first hand. I beseech you to lend every effort, however small, to preserve the freedom of the American way of life, for when you have killed the ambitions, the hopes, the prides, the loves, the gambles and trials that are in a man's heart, you have killed the man—and when you have killed the man you have killed the nation.

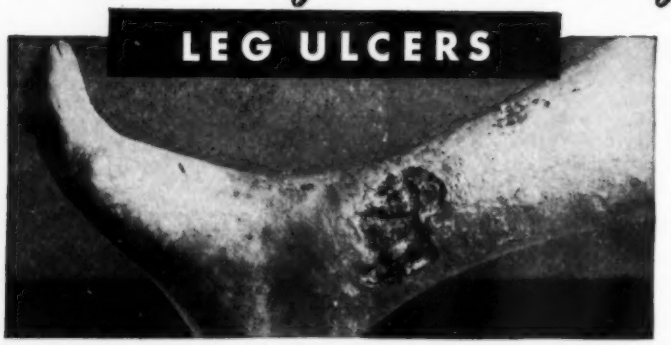
—From "Socialistic Medicine in England," by ROBERT E. S. YOUNG, M.D., in *Connecticut State Med. J.*, January, 1949.

Not a Welfare Project

THERE is another point I want to stress and it is this: a medical service is not a welfare project. Any industry which embarks on a project like this with the idea that it is a nice thing to do for the employees, will be doomed to disappointment. A medical health service must and will pay a profit and that is the only basis upon which it should ever be started....Many factories employ a nurse and not a doctor and feel that they have a medical serv-

for the successful treatment of...

LEG ULCERS



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ice. My colleague has emphasized the need for a doctor in pre-employment and periodic examinations, and I am sure you can see that in the work I have described, a physician is essential. A nurse without a doctor is not a medical service no matter how you look at it. The converse is also true. A well-trained nurse and a physician interested in people as human beings are essential for proper teamwork and will result in an efficient service. Such a service is nothing more nor less than bringing health in its broadest understanding into the reach of the worker.

—From "Total Health in an Industrial Medical Service," by H. M. HARRISON, M.D., in *Industrial Health Review*, 1:1, 7-10, January, 1949.

Medicine Under Hitler

EVERY phase of a physician's professional activity was minutely regulated, and it was expected that the physician would accept and further the principles of National Socialism. Recalcitrance carried economic penalties such as loss of official position and license to practice. Behind these loomed the jail and the concentration camp.

—From "Medicine Under Hitler," by GEORGE ROSEN, in *Bulletin of the New York Academy of Medicine*, February, 1949.

Disability Insurance

FOR medical men, the question of disability insurance has broad implications. It is obviously a short step from paying for loss of wages caused by sickness to paying the sickness costs themselves. Then, too, disability insurance sometimes puts the doctor on the spot. He must certify, eligibility for benefits. If he says to a laggard patient, "Get up and go to work," the backfire in ill-will is hard to avoid. Rhode Island and California already have statewide, compulsory programs. The Rhode Island plan is a state monopoly. The California plan is a combination of government and private enterprise; the state covers workers who don't have protection through private plans. This year, New Jersey became the third state on the list. Its program will be patterned after California's. *Uncle Sam's Version*: The Federal government is also in the business, but only for railroad workers. Though less than two years old, the Federal plan may not last much longer. Committees of both houses of Congress reported out bills that would kill the program. Though no further action was taken, there was strong feeling that the government was no longer justified in making a special case out of railroad workers.

—*Insurance Economics Survey*, quoted in *Pennsylvania Med. J.*, January, 1949.

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DR. PILGRIM

NOW enroute to eastern Indiana for certain dust problems, and the taking of samples for later analysis, and finding the winter weather mild, which was favorable to the investigation, and reviewing the problems with officials of the company and making certain suggestions for improvement. . . .AND concerned with manuscript material and printed pages, and correspondence and

plans for future problems. . . . AND listening to the New York Philharmonic play Brahm's Fourth and enjoying it much; and in one of the modern mysteries, coming across this passage: "Mike Jordan's mother was the sort of woman who when she learned she was to have a child looked at beautiful pictures and listened to great music. As the result, Mike grew up to make family gatherings more than usually hideous by his rendition of The Melody in F and Rachmaninoff's Prelude". . . . AND next to the Drake Hotel for the Ninth Annual Congress on Industrial Health, sponsored by the Council on Industrial Health of the American Medical Association and the Division of Industrial Hygiene, U. S. Public Health Service; and here first seeing DR. and MRS. PETERSON, JACK BLOOMFIELD and KENNETH MORSE, with discussions of many interesting problems and occurrences; and next day meeting with the Council on Industrial Health and especially interested to hear GEORGE LULL'S experience with reactions by correspondents, to the $25.00 assessment; and making a brief report for the Committee on Workmen's Compensation; and in the afternoon to the AMERICAN ACADEMY OF OCCUPATIONAL MEDICINE, the meeting being on "Education in Industrial Medicine," where DR. ROBERT KEHOE acted as moderator and there were papers by DRS. LEONARD J. GOLDWATER, JOHN H. FOULGER, ERNEST W. BROWN, DONALD D. ANDERSON, EDWARD C. HOLMBLAD, followed by a general discussion, from all of which there can now be no doubt that the various programs for the education of industrial physicians are closer together than they have ever been before and that there is more general agreement now than there has been in the past; and having a session with MANFRED BOWDITCH relative to certain problems presenting themselves for solution; and afterward to the cocktail party and dinner of the AMERICAN ACADEMY and hearing DR. E. G. BARR, of National Cash Register (whom PILGRIM hadn't seen since many years ago when he visited the plant) talk of his 37 years' experience, particularly with human relations; and of great interest to hear of the few difficulties the company has laborwise; and later in the evening with RED JOHNSTONE and JOHN FOULGER for most interesting discussions. . . . AND to the opening general session of the Council on "New Horizons in Industrial Health," at which were Moderator DR. E. J. MCCORMICK and the following subjects and speakers:

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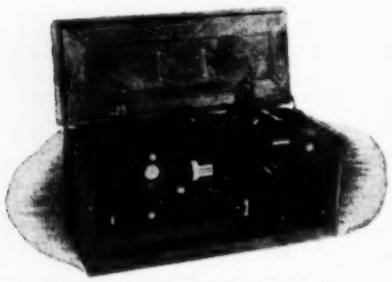

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ing interesting discussions ....AND next day to another panel session concerning progress in reducing occupational disability, and the contribution of industrial medicine more efficiently to the health problems of special groups; and at luncheon with DR. JEAN FELTON, of Oak Ridge, Tennessee, and seeing many old and new faces; and in the afternoon to the final session of the panels on important factors affecting industrial medicine's relation to medical care insurance... AND then to the desk, and bringing up the notes and various impressions, and looking over manuscripts; and reading some of the peculiar statements regarding smoke in one of the popular magazines; wherefrom the conclusion that if hysterical outbursts can achieve scientific results, there should be no doubt about the outcome....AND working in the laboratory with respect to different types of samples and making various analyses, and routinely with correspondence; AND in the meantime hearing the Chicago Round Table of the Air with respect to Federal Health Insurance where DR. MORRIS FISHBEIN acquitted himself very well, even in the short period allowed....AND again on routine matters and discussions with publishers; arranging material for proceedings of meetings, and amending reports; and having conference with DR. CARL PETERSON and BILL HOLLOWAY and DR. ERNEST BROWN on workmen's compensation problems; and meantime listening to Wallenstein's Symphony for Youth in which selections were played from Bach, Charbier, Debussey and Tschaikowsky, and then to New York Philharmonic playing Tom Scott's The Sacred Heart, Ernest Block's Hebrew Rhapsody for cello, which was done well by Leonard Rose, Clouds and Festivals by Debussey and Symphony No. 6 in E Minor by Vaugh Williams, the British composer.... AND making plans for a sojourn in Detroit and environs, of which more later.

In Connecticut

PRAISE for Connecticut in its efforts toward furthering the development of industrial services and the need for attention on the part of medical students regarding the opportunities that exist in the field of occupational medicine, highlighted the January meeting of the Connecticut State Medical Society's Committee on Industrial Health, held at the Endee Club here on January 26. DR. CLARENCE SELBY, medical consultant to General Motors, the meeting's principal speaker told the group the essential step in the further advancement in occupational medicine is education. He said there exists a great need for trained doctors and nurses, not only in large industrial plants but those classed as small or medium-sized. He declared Connecticut can "justly be proud of its continuing development in industrial medical services." He lauded the work of the Committee on Industrial Health and the program being carried on at the Institute of Occupational Medicine and Hygiene. He expressed hope that more such institutes will be established in months to come. "There's a fine future awaiting any young man in occupational medicine, especially if he stops to realize what the field offers in opportunities for research and service." Speaking as a member of a panel group following DR. SELBY'S address, DR. ALBERT GRAY, director of the Bureau of Industrial Hygiene in the State Department of Health, discussed the "grand job" being done by industrial doctors and nurses in employer-employee relationships. He outlined the many valuable returns to industries which are conducting an effective program in preventive medicine. DR. JOHN M. LYNCH, New Departure clinical fellow in industrial medicine, related his experiences in the work since being assigned to the division's Bristol plant six months ago. DR. J. WISTER MEIGS, director of the Institute of Occupational Medicine and Hygiene at Yale, reviewed the program of the institute. ALAN CURTISS, vice-president of the Scovill Mfg. Co., in Waterbury, spoke for the Connecticut State Manufacturers' Association. He told of the great progress which has been made along lines of safety and health of employees because of the knowledge possessed by plant physicians and added, "these men are doing a grand job in human relations." DR. ROBERT QUIMBY of Hartford mentioned the importance of industrial physicians possessing the knowledge of job requirements in order to properly place employees in industrial jobs. DR. C. FREDERICK YEAGER, chairman of the Committee on Industrial Health, explained the aims of the organization and reviewed the activities of the committee. DR. PRESTON N. BARTON, New Departure's Bristol plant physician, presided and introduced the speakers. Matthew C. Wagner, personnel manager of the plant, welcomed the group in behalf of the division. Prior to gathering for dinner the doctors made a short tour through manufacturing departments.

—*Bristol, Connecticut, Press,* January 27, 1949.

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[1]Encyclopaedia Britannica

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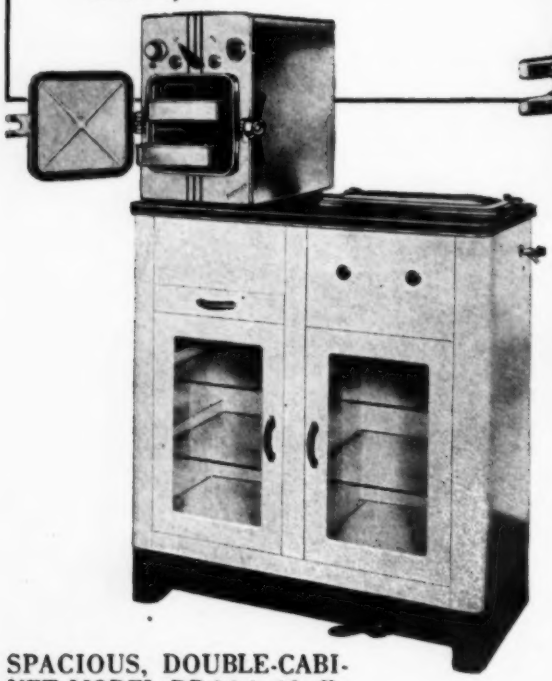

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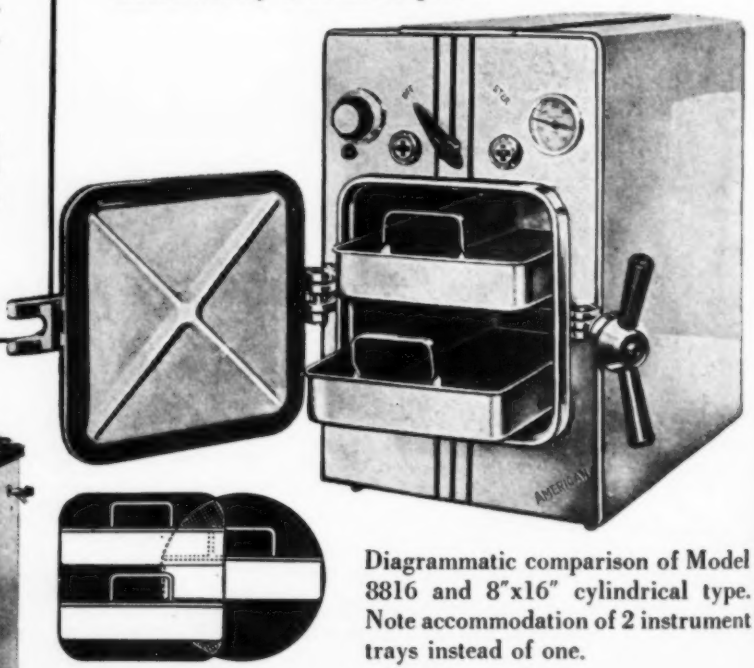

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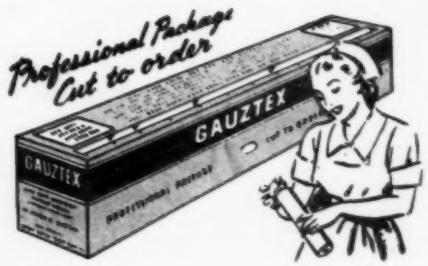

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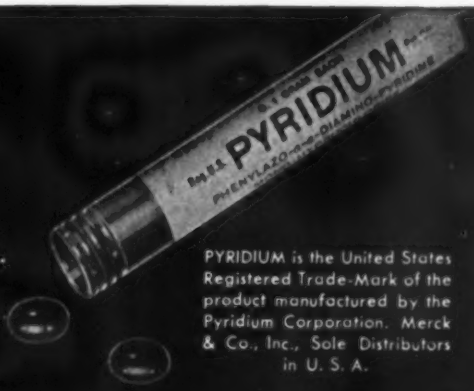

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* 1. Cannon, A. Benson, and McRae, Marvin E.: Treatment of Scabies, J.A.M.A. *138:*557 (Oct. 23) 1948.

2. Wooldridge, W. E.: The Gamma Isomer of Hexachlorocyclohexane in the Treatment of Scabies, J. Invest. Dermat. *10:*363 (May) 1948.

3. Niedelman, M. L.: Treatment of Common Skin Diseases in Infants and Children, J. Pediat. *32:*566 (May) 1948.

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Influenza

SURGEON GENERAL SCHEELE: "The Public Health Service and the medical departments of the Army, Navy, and Air Force are in constant touch with the situation both here and abroad through the Influenza Information Center at the National Institutes of Health and otherwise. There have been no significant outbreaks of influenza in this country so far this winter. In fact, the incidence of this disease reported during the past half year is lower than that reported for the corresponding period in every other year since 1945. The figure for the period from July 31, 1948, to January 8, 1949, is only 36,278 cases reported, as compared with 362,248 three years ago. Two years ago it was 32,975; one year ago, 36,696."

—Public Health Service Release

Industrial Health Activities

THE greatest benefit from a recent 10-year spurt in industrial health activities has been "take home" health, where employees actually bring to the family at home the principles of good living and health care, according to a survey recently conducted by the Mellon Institute's Industrial Hygiene Foundation. DR. C. O. SAPPINGTON, of Chicago, who made the study in 277 plants in 33 states, found that 54% of the plants had industrial hygiene services in some form, and attributed the showing to a war-time acceleration of health measures. The report suggested: (1) increased confidence and respect between medicine and management; (2) fewer differences in various health programs; (3) better understanding of the terms "industrial hygiene," "industrial safety" and "industrial sanitation"; (4) a higher reward for the importance of prevention by professional personnel; and (5) more time to be devoted by physicians and nurses to acquiring first-hand knowledge of processes and materials.

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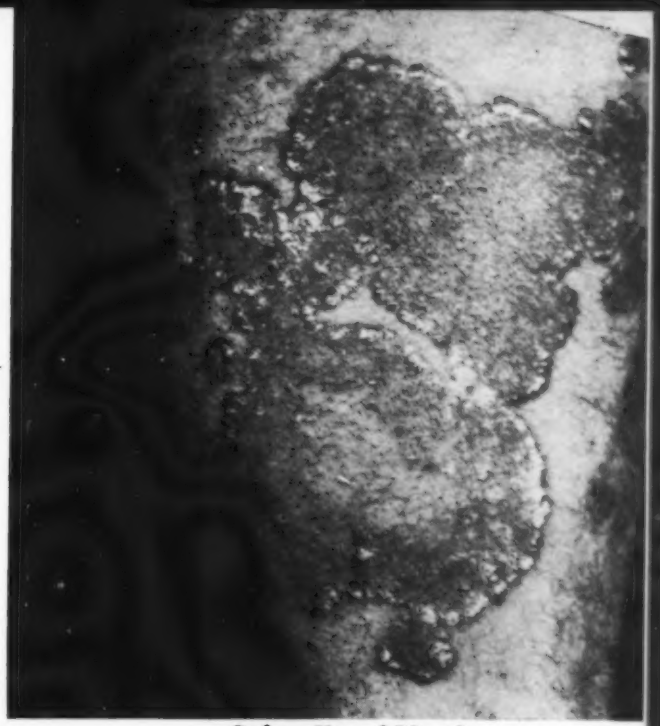

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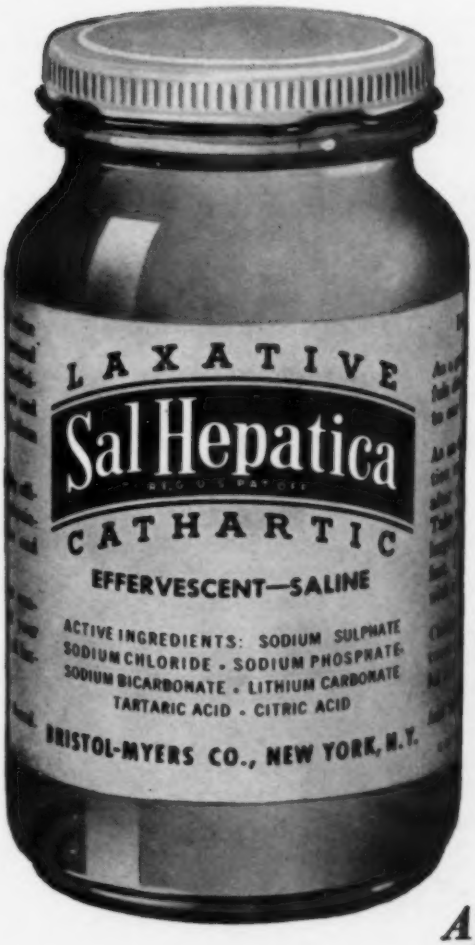
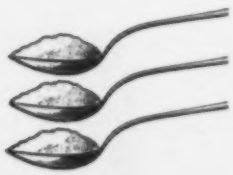
Pleasant
Prompt



A pleasant, effervescent saline laxative which acts by osmosis to produce soft fluid bulk . . . stimulates peristalsis . . . promotes prompt but gentle evacuation.

Aperient*

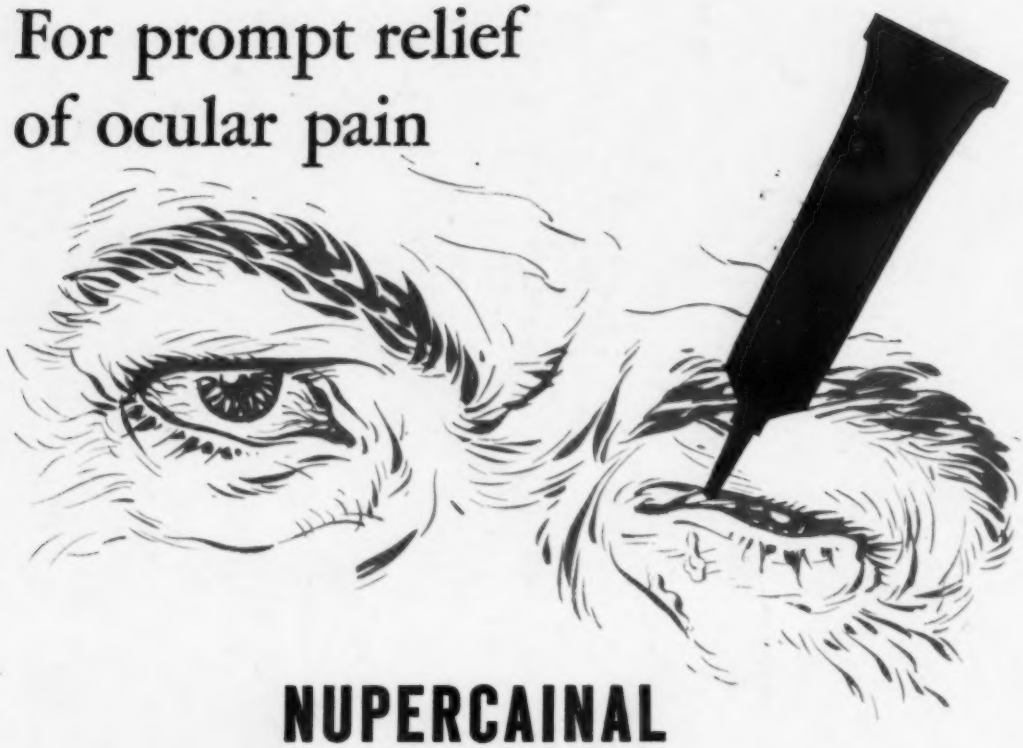
Laxative*

Cathartic* 

Product of **BRISTOL-MYERS • 19 West 50th Street, New York 20, N. Y.**

**Average dose*

For prompt relief of ocular pain



NUPERCAINAL

OPHTHALMIC

a potent anesthetic

Effective relief of pain may be expected with the use of Nupercainal Ophthalmic Ointment . . . after removal of foreign bodies from the eye, in corneal abrasion or ulceration, sties, flash burns and conjunctivitis. It is also recommended for use as a post-operative dressing.

Prompt and prolonged anesthetic action are well-known characteristics of Nupercaine, the effective agent in Nupercainal Ophthalmic Ointment. Studies have shown that Nupercaine in ointment form is non-irritating, and has no deleterious effect on regeneration of corneal epithelium.[1]

1. Smelser & Ozanics: Arch. of Ophthal., 34: 4, 271, Oct. 1945

NUPERCAINAL OPHTHALMIC OINTMENT, tubes of 4 Gm., containing Nupercaine Base, 0.5 per cent in white petrolatum, with convenient applicator tip.

Ciba PHARMACEUTICAL PRODUCTS, INC., SUMMIT, NEW JERSEY

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